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Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association Northern Minnesota Medical Association and Minneapolis Surgical Society

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FEBRUARY, 1925

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MINNESOTA MEDICINE

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VOL. VIII FEBRUARY, 1925 No. 2

ORIGINAL ARTICLES

FOREIGN PROTEINS AS THERAPEUTIC AGENTS IN THE TREATMENT OF OCULAR INFLAMMATION*

JOHN F. FULTON, M.D.
St. Paul

New therapy measures are always sure to receive close attention from medical society members. As important, however, as therapeutic measures are, it is most unfortunate that so little attention is paid to them in our medical societies or in our medical journals—surgical procedures receiving far more attention.

The foreign protein treatment of ocular diseases has become very popular in recent years and judging from results, as recorded in the vast amount of literature on this subject, has justly earned its reputation.

The now universal recognition of the astonishing therapeutic beneficial results obtained by a number of the foreign proteins, especially milk and tuberculin, for the relief of acute and sometimes chronic inflammatory disease of the eye due to a variety of etiological factors, has been the means of bringing forth others which are producing similar gratifying results as therapeutic agents.

Foreign proteins have been taken from the realm of observation and empiricism and placed in that of applied science as a result of careful work in the laboratory and painstaking analysis of clinical observation, so that the objection to them can no longer be made that we are injecting a substance that we know little about into a body that we know still less about.

I am fully aware that our profession is disposed to become over-enthusiastic over new remedies, which is generally detrimental to the scientific progress of ophthalmology as well as to the public.

*Read before the annual meeting of the Minnesota State Medical Association, St. Cloud, October 9, 1924.

Some one has said that all new remedies undergo five stages:

1. The nascent stage.
2. The stage of attention.
3. The stage when the remedy is recorded as infallible.
4. The stage when it is discredited.
5. The last stage, that of sedimentation, when wise and ripe judgment of experts has finally settled the exact place to which the remedy is entitled. I feel that we have about reached the last stage now in regard to the usefulness of foreign protein in the treatment of inflammatory eye troubles.

Every protein injection is followed by two pronounced reactions in the body. One reaction is caused by the toxins contained in the injected fluid and this general reaction manifests itself by elevation of temperature, some nausea, and increased pulse rate. Also, typical focal reactions occur such as flaring up of the tonsils and old inflammatory lesions in the region of the eye and nose.

The therapeutic effect is brought about by stimulation of the involuntary nervous system, and of the bone marrow system, and an increase of the flow of the leucocytes to the affected area, with increased activity of the lymphatic system and permeability of the vascular walls. The stimulation of bone marrow was proven by Müller by laboratory experiments.

Non-specific therapy is effective only in cases where there is an infected area which may be in any part of the body, so these remedies are not confined to ophthalmology for their field of usefulness but are just as important to the general practitioner in medicine and to the general surgeon.

In a splendid paper written by Dr. Carroll DeCourcy, of Cincinnati, he records a number of cases of other diseases from which favorable results were obtained by this same form of therapy, such as chronic arthritis, epididymitis and prostatitis.

The theories as to how eye symptoms are relieved, and the number of diseases cured by protein therapy, are about as numerous as the authors who have written about them.

Vaughan suggested that the improvement is due to the protein enzymes found in the blood at the time, but, at any rate, protein injections result in the stimulation of the organism, showing that the resulting reaction is the summation of all the forces of resistance with which it is equipped, a rapid increase of the leucocytosis, a powerful stimulation of the glands of internal secretion.

One of the most gratifying results obtained by protein therapy is the relief of pain in all forms of eye diseases associated with inflammation. In many of these cases the analgesic effect is more prompt and more lasting than that produced by morphia.

I have not had an opportunity to try boiled milk in those severe cases of glaucoma for which it is necessary to resort to powerful solutions of eserine and hypodermic injections of morphia in order to control pain. I am inclined to think we might obtain great relief from this treatment as we do in cases of severe irido-cyclitis, in which condition the milk injection obtained its first brilliant success. So the place of protein therapy, not only in ophthalmology but in general medicine, is becoming stronger and more keenly appreciated every year. This gratifying result has been brought about by the painstaking pursuits in our laboratories of physiological chemistry, associated with the careful clinical data.

The great value possessed by the non-specific remedies lies in their ability to stimulate the body resistance to its greatest efficiency, thus bringing about the wonderful results observed and recorded by a vast number of our best known and most reliable observers—a therapeutic shock so to speak; but, if reaction is impossible, the remedy is useless. It is another case of the "all or nothing" principle. They yield all, almost instantaneously, or they yield nothing at all.

The two foreign proteins, to which my attention has been chiefly directed, are milk and tuberculin. The evidence in favor of both of them as being most valuable, powerful and reliable therapeutic agents, as recorded in the medical literature of the last few years, is overwhelming. Those who speak unfavorably in regard to milk seem to be only those who have used it but little, if at all.

Dr. Key, of New York, who has written most favorable literature on the subject of protein therapy, is a good illustration. He says he has used it in two cases only, with unsatisfactory results, and both of them chronic cases.

H. Coffez, a French authority, declares that milk occupies a most important place in the treatment of the eyes and is the most satisfactory of all the substances that have been used. From the very first injection, the pain is relieved and the inflammation and effusion disappears and the pupil dilates. Traumatic hemorrhage and operative hemorrhage in the anterior chamber or vitreous rapidly absorbs.

Dr. James M. Patton, in his splendid paper on "The Pros and Cons of Foreign Protein Injections for Affections of the Eye," reports a case of irido-cyclitis, with severe pain and a rapidly advancing plastic exudate, which looked like beginning panophthalmitis, which was relieved in a few hours of pain and irritation by one injection.

This is very similar to a case of my own which I reported in MINNESOTA MEDICINE a few months ago.

Doctor Arganaraz, of Buenos Aires, reports a case of grave panophthalmitis and severe orbital cellulitis which was relieved by three 10 c.c. doses of boiled milk given on alternate days.

Those who have used the milk therapy most seem to have the greatest confidence. Bargy resorted to the use of this remedy in three thousand eye diseases, with most satisfactory results—the pain, edema and secretion disappearing with astonishing rapidity.

The special advantage that milk has is its great richness in alexines and a large variety of enzymes. We have only time to give a very short space to the mode of administration. A small dose should be given at first in order to test the anaphylactic tendencies of the patient. This is usually about 3 c.c. of milk which has been boiled for four minutes and cooled. If this produces little or no reaction, it is followed up with a dose of 10 c.c. on the following day. It may be necessary to repeat this dose three or four times and always intramuscularly on succeeding days.

Some attempts have been made to introduce milder remedies, with a view to bringing about the same results, without producing the severe febrile condition brought about by milk. One of these is aolan. Many favorable cases have been reported

by a number of physicians who have used it. I myself believe that an extract of milk could be worked out which would bring about the same happy results that could be administered in a much more agreeable and convenient way.

Tuberculin now has such a satisfactory reputation for the relief of tuberculous eye diseases that to say anything in its defense seems superfluous. However, so great an authority as Doctor Verhoeff, in discussing a paper written by Doctor Weeks, of New York, read before the American Ophthalmological Society at its 1918 meeting, announced that he had ceased using tuberculin as a remedy in these cases and depended upon hygienic measures for relief.

The harm that this statement might have done to one of the most useful therapeutic agents known to ophthalmology was offset by the reply of Doctor Weeks, in summing up the discussion, in the following words:

"The statement of the last speaker (Doctor Verhoeff), in regard to the use of tuberculin, does not seem to be of very great value. I have had three cases referred to me for enucleation, advised by the people who sent them to me. These patients have at present very good eyes because the careful use of tuberculin was persisted in."

The Tuberculosis Department of our St. Paul Free Dispensary has records of a number of similar cases. Those of you who listened to the lectures of Professor Fuchs, delivered at our State University, will remember his statement that eyes which he formerly enucleated are now saved, with useful vision, by persistent tuberculin treatment.

In the discussion of Doctor Weeks' paper, Doctor Byers, of Montreal, remarked that "when supposedly tuberculous eyes do not react favorably to tuberculin treatment, a reconsideration of the diagnosis is necessary, for it has been my experience, in ocular tuberculosis, that tuberculin, if properly given, seldom, if ever, fails to do good."

I want to refer briefly to the phlectenular group of eye cases. For their relief I am depending upon tuberculin almost exclusively, with the most gratifying results, using locally a solution of adrenalin and butyn for the relief of the photophobia and irritation of the bulbar or lid conjunctiva. I rarely ever resort to calomel or the yellow precipitate, using them only when, through neglect, or a mixed infection, we get an obstinate nebulous condition or a deep seated leucoma. For results I refer you to the Tuberculosis Department of the St. Paul Free Dispensary, conducted by Doctor E. B. Daugherty.

In the tuberculous cases, I quite agree with Parsons in saying that tuberculin treatment is best carried out by a practical bacteriologist who has familiarized himself with the proper technique.

One of the newest of the proteins that offers great hopes of brilliant success is lens antigen in the treatment of incipient cataracts, or, perhaps, in the way of producing immunity to cataracts.

The following are the conclusions that I have arrived at after a most careful survey and study of the literature on this subject and as a result of my own clinical experience:

1. Non-specific therapy is a most valuable and reliable aid in the treatment of all inflammatory conditions of the eye other than those due to syphilis or trachoma.

2. Milk is the most reliable and efficient of all of the foreign proteins in the treatment of acute inflammation of ocular structures due to focal or local infection.

3. Typhoid vaccine and diphtheria anti-toxin are the next most important and in the order named.

4. Tuberculin is our most reliable therapeutic agent for the relief of all forms of tuberculous infection of the eye.

5. Mixed infections are common, in which it is necessary to alternate protein treatment from day to day in order to obtain satisfactory results. Schafer had this in mind when he recommended heterogeneous vaccines.

6. Inasmuch as protein is the active agent in bringing about the curative results of all the remedies above referred to, it is quite likely that each ocular practitioner will obtain the best results with the protein which he has had the most experience in using.

I fully agree with Dr. Benn Witt Key that the time will soon come when the treatment of pneumococcic and staphylococcic infection of the refractive media of the eye will consist in the administration of a foreign protein as soon as it can possibly be injected, just as antitoxin is now demanded in the treatment of diphtheria.

The bibliography of non-specific protein treatment is enormous, a careful study of which indicates that foreign protein therapy marks a very important milestone in the evolution of therapeutics. Only a partial list of the titles of important papers communicated in recent years are herewith attached:

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DISCUSSION

DR. PAUL BERRISFORD (St. Paul): Dr. Fulton's paper should be an inspiration to us coming as it does from a man who though old in experience still retains the enthusiasm of youth. He has seen meritorious remedies acclaimed as revolutionizing panaceas only later to be as extravagently condemned. Nevertheless he is willing to employ new therapeutic measures and appraise them at their true value.

Although I have had but limited personal experience with parenteral injections of milk, through association with one of my colleagues, who was perhaps the first in the Northwest to administer this remedy, I have seen many injections given and have observed the results obtained. Our observations were practically in accord with workers reporting in the literature and are as follows:

1. In keratitis interstitialis in about half of the cases pain and photophobia are lessened. Milk injections will not prevent the involvement of the fellow eye.

2. In keratoconjunctivitis eczematosa, especially where are multiple ulcerations, milk injections act favorably upon the pain and photophobia. They also improve the general condition of the child although recurrences cannot be prevented.

3. In iritis a beneficial effect is produced in the majority of cases. Anterior chamber opacities and pupillary exudates disappear quickly. In severe cases of tuberculous iritis milk injections exert a helpful influence.

4. In choroiditis disseminata this measure has been seen to raise the visual acuity.

5. Corneal ulcerations in trachoma are in many cases benefited by milk injections although no effect whatever is produced on the trachomatous process.

6. Corneal ulceration, the result of a foreign body, rapidly becomes clean through this remedy and the hypopion quickly disappear.

7. In gonorrheal ophthalmia milk injections exert a most beneficial influence. Where, however, impending corneal perforation is evident they are contra-indicated.

Whatever the eye condition, few there are who have the temerity to employ foreign protein therapy alone and until this is done its exact value will remain unknown. In inflammatory eye conditions where we seem therapeutically impotent the employment of milk injections may prove a very valuable adjuvant.

Milk substitutes, triple typhoid vaccine, caseosan, deuteralbumos, albusol, etc., whatever their added merits may be, have in the hands of the experienced proven no more valuable in the relief of eye conditions than parenteral injections of milk.

Dr. William R. Murray (Minneapolis): Non-specific foreign proteins have proven to be of definite clinical value in some types of acute and subacute ocular involvement, although their use is somewhat empirical. The injection of these foreign proteins produces an increased general defensive reaction, manifested by temperature, increased leucocytosis, with increased lymph circulation, dilated blood vessels and increased diapedesis. The analgesic effect is sometimes quite pronounced.

Various heterogeneous proteins have been used, such as normal horse serum, milk, goat serum, triple typhoid vaccines, diphtheria antitoxin. The most generally used form has probably been milk, injected intramuscularly beginning with 3 to 5 c.c. as an initial dose. Care must be taken not to inject into a blood vessel. Dosage is increased according to the reaction obtained.

Commercial preparations may be used which possess the advantage of standardization of dosage, sterility, availability and suitability for intravenous injection.

During the past two years I have used typhoid serobacterins either intravenously or subcutaneously; for intravenous injections, beginning with a dosage of 50,000,000 and increasing according to the reaction obtained. The reaction is sometimes severe; chills, temperature, increased leucocytosis, headache—lasting for a few hours. This reaction may also be obtained by the subcutaneous method, but in severe ocular inflammations, I prefer the intravenous and keep the patient in the hospital until the reaction has subsided.

The results obtained by the use of non-specific proteins are usually encouraging, but this method of treatment is supplementary to other indicated therapy and should be used in conjunction with it.

The types of ocular infections that seem to be most benefited by the use of foreign proteins are the acute and subacute involvements of the anterior portion of the eye, such as iritis, some forms of corneal ulcers and keratitis, episcleritis, recent anterior vitreous opacities. It has also been used with some benefit in post-operative infections, though I have had no experience with its use in such cases.

I do not believe that foreign protein treatment has yet reached its ultimate place in ocular therapy and we should not be over-enthusiastic in regard to results. It has its indications, and the results are frequently satisfactory, but it must be used as an adjunct to other indicated methods of treatment.

Dr. Carl Larsen (St. Paul): The employment of foreign proteins in ophthalmology I feel has been a real contribution to ocular therapeutics. I believe it was Schmitt of Prague in 1915 who was the first to employ milk in ocular disease. He chose milk because it was easy to obtain and because its chemical composition was constant, whereas the composition of the different artificial proteins and their derivatives was subject to a great deal of variation. We must bear in mind that milk and all the foreign proteins have their limitations. I believe that the field of usefulness, especially in milk, is in inflammation of the anterior segment of the eye, especially acute inflammation. The best results obtained are: first, in gonorrheal conjunctivitis, and I believe here it is a specific; secondly, in iritis and irido-cyclitis; third, in postoperative infection; and fourth, as a prophylaxis in infections following perforating injury of the eye.

Linder of Vienna, who has done a great deal of work with milk and who is a very renowned bacteriologist, has shown conclusively that in the majority of instances in gonorrheal conjunctivitis the gonococcus is destroyed in from thirty-six to forty-eight hours following milk injection. Our experience has been limited almost entirely to iritis and irido-cyclitis, and it has been astonishing to note the effect on a pupil that is bound down and does not respond to atropin, to find six to eight hours after injection a marked dilatation of the pupil with complete freedom of pain.

We usually give 10 c.c. the first day, 12 to 15 c.c. the second, rest on the third, 10 c.c. on the fourth, and 12 to 15 c.c. again on the fifth day. If there is no reaction after the second or third injection I believe it is useless to attempt further injections. The reaction usually occurs in three to six hours. We have not observed a single instance of anaphylactic shock nor have we had a single infection following its use. I believe there are no contraindications to the use of milk unless it probably is a tuberculous condition. We find a great many men who condemn milk or are rather lukewarm regarding its use, and they argue that milk is not properly standardized, but this is true, with one or two exceptions at least, of all the foreign proteins.

Dr. John F. Fulton (closing): I have only a word to say in closing in regard to the points brought out by those who have discussed my paper.

I am extremely grateful to Dr. Murray for his very thorough discussion of the paper, as well as to Dr. Larsen for bringing out and stressing the important practical points in the milk protein treatment of ocular diseases.

Dr. Berrisford referred to the rather unsatisfactory results of this treatment in the phlyctenular group. In our clinic, tuberculin is so perfectly satisfactory in the treatment of this class of cases that we never think of using anything else.

I am extremely sorry that Dr. Benedict is not here to take part in the discussion. It would be extremely valuable to all of us to have had the result of his experience in the use of these remedies in the vast amount of material that he has at his disposal in the Mayo Clinic.

The effects of foreign proteins upon inflamed irises that do not respond to atropin is sometimes marvelous, resulting in complete dilatation of the pupil in a very short time.

In regard to whether or not the local treatment that we formerly resorted to in the treatment of this class of cases is necessary, together with the protein treatment, depends upon the stage of the disease. In the early stages it may not be necessary.

OUR PRESENT KNOWLEDGE OF CANCER*

LOUIS B. WILSON, M.D.
Rochester, Minnesota

Cancer is causing an enormous number of deaths in every country in which accurate statistics have been collected. There is a general impression that cancer is very rare among native tribes. It is, of course, impossible to obtain convincing statistics concerning the occurrence of cancer among native races, as for example in Africa, or among the Indians of North or South America, but the almost universal testimony of physicians who have been practising for a long time among the primitive Indian or African races is that they rarely, if ever, see any cases of cancer.

On the other hand, among civilized peoples, whether of homogeneous or mixed origin, where statistics are sufficiently complete to be reliable, the number of deaths from cancer is known to be very large. Dr. F. L. Hoffman, a statistician who has given the subject very long and thorough study, estimates the total deaths from cancer in the United States at from 90,000 to 100,000 annually. This is probably a very conservative estimate, since the census death rate from cancer for 1921, for example, was placed at 100 to each 100,000 of population. In many places where the records are good the rate was much higher, as for example San Francisco, where it was 151.8 for each 100,000. This rate was even exceeded by a city on the western continent, St. John, New Brunswick, where the rate for the same year was 152.6 for each 100,000. Other cities with extraordinarily high death rates from cancer are Albany, Boston, Cincinnati, Des Moines, Los Angeles, Philadelphia, Providence (R. I.), Sacramento, St. Joseph (Mo.), and Springfield (Ill.), all of which had death rates in excess of 120 for each 100,000 population in 1921.

High cancer death rates are not confined to large cities. Tippecanoe County, Indiana, with a population of about 40,000, and in which the only large town is LaFayette, which has a population of about 25,000, had an annual cancer death rate of 123.5 during the ten-year period 1911-1920. In 1917 the county's death rate from cancer was 160, contrasting with a rate of 88.7 for the entire state of Indiana.

It is interesting to compare the present mortality from cancer with the mortality from tuberculosis. In England, for example, cancer is a more fatal disease for women than is tuberculosis. The last statistical bulletin of the Metropolitan Life Insurance Company of New York contains a table based on the experience in what are called the registration states of the United States for 1922, which shows that a child having once reached ten years of age is, according to present indications, in greater danger of dying ultimately from cancer than from tuberculosis. In general in those countries in which by better knowledge of tuberculosis and better methods of fighting it, the death rate has been decreased in the last twenty years, there has been an increase in deaths from cancer which has in many instances more than made up for the decrease of deaths from tuberculosis.

There is also a general consensus of opinion that deaths from cancer have been increasing in all countries in which accurate statistics are available ever since the time when such statistics first became available. Thus in sixty-five years in England the deaths from cancer were apparently multiplied seven times. Dr. Hoffman has combined the death returns from thirty-eight cities of the United States which have a total population of more than 22,000,000 or about one-fifth the entire population of the continental United States. During the four-year period 1912-1915, these cities had a cancer death rate of 87.9 for each 100,000. During the next five years the rate increased to 95.4 for each 100,000 and during 1921 it reached 101.5.

Now, all this apparent increase in cancer mortality may not be real. Some of it may be due to more accurate assignment of causes of death in making out death certificates. But even granting the probability of error, when an apparent increase in the average rate from 88 to 101 for each 100,000 can occur in the thirty-eight principal cities of the United States in ten recent years, during which time much has been done to arouse the public to an active personal interest in the subject, the situation is, to say the least, sufficiently alarming.

Incidentally, it may be remarked that we shall never know the exact facts concerning mortality from cancer or for that matter from many other diseases until people insist on having proper examinations made of the bodies of their dead relatives. At present not more than 2 per cent of the dead in the United States are so examined.

*Presented at a public meeting under the auspices of the Seaboard Medical Association at Rocky Mount, North Carolina, December 3, 1924.

After the increase in the cancer death rate perhaps the most important consideration from the sociologic standpoint is that cancer is most fatal at the period of life when people are most useful. There are certain forms of tumors which cause death in younger and others in older children, but these are comparatively very rare. The old also may be affected with cancer, but the great bulk of mortality from cancer occurs in persons between thirty and seventy years, in other words in the very heart of the period in which they are of most important service to the community. The economic loss is not due to the mortality alone, but to the expense of the care of the sick. Death from untreated cancer is much slower than death from most acute fatal infectious diseases although more rapid than death from many of the chronic functional diseases of the body.

The pain and suffering cannot be estimated. Even with the most satisfactory methods of treatment which have been devised for alleviating these, there is still a considerable basis for the general fear with which most people regard cancer. Much of this fear, however, is really without foundation. For example, there is an all too general belief that cancer is incurable, an absolutely false conception of the disease, which is perfectly curable in its early stages. Our present fear of cancer also is to some extent based on the old belief that cancer is contagious. Indeed, it is less than one hundred years since cancer was regarded as highly infectious and patients with cancer were shunned even by their friends. Fortunately, we have come to know positively that whatever may be the cause of cancer it cannot readily be transferred from one person to another. It is the universal experience of surgeons and nurses who are treating and caring for patients with cancer that they may do so with perfect safety to themselves and to their other patients. Incidentally this is one of the strongest arguments against the theory that cancer is a microbic disease, that is, that it is due to some kind of germ. But we cannot go too far in this direction for we must remember that some kinds of germs may be even more difficult to transplant from one person to another than it is to transplant some of the higher plants, as for example members of the squash family, from one part of the garden to another. The only thing we can be sure of is that in our handling of cancer patients we can disregard any probability of contracting the disease ourselves or of carrying it to other people.

But if we cannot contract cancer from another person, can we inherit it or the tendency to it from our parents? This question is almost impossible to settle by human statistics owing to the many years in a human generation, to the frequent outcrosses in families and to the unreliability of older statistics. But the questions of heredity are the subject of a large amount of serious laboratory study at present. It may be interesting to summarize here the results of these and other experimental studies to indicate what is being done to solve the vital problems in relation to cancer.

It is only in relatively recent years that we have come to know what inheritance really means and what are its laws. Now, however, as a result of the elaborate studies which have been made on plants and the lower animals, we may speak with assurance concerning many of the laws of heredity. Without going into these in detail, it may be said that it is now possible for the skillful animal or plant breeder to breed into strains of animals or plants certain characteristics until they occur with almost clock-like regularity, a regularity which can be predetermined with great positiveness. In such breeding experiments with either plants or animals, the breeder has found out that certain special characteristics which he is studying tend naturally to increase progressively in the progeny of selected parents, and that there are others which tend naturally to decrease progressively in the progeny of selected parents. These two groups of characteristics the student of heredity designates respectively as dominant and recessive.

In the study of the heredity of cancer by breeding experiments the most thorough and the most important work has been done by Dr. Maud Slye, at the University of Chicago. Slye has used thousands of mice of many different varieties and strains. Each one of her particular breeding strains she has kept under observation before beginning her breeding experiments long enough to know whether spontaneous cancer was occurring in the strain or was not occurring in it. Starting from this accurate foundation, her breeding experiments have consisted in crossing cancer strains with each other, cancer strains with noncancer strains, and noncancer strains with noncancer strains and studying the results in their progeny throughout many

generations. On the pathologic side her work has been carefully checked by Dr. H. G. Wells. Now, there are but three human generations to a century, but there are six mouse generations in a year. On this basis Slye's observations on many single strains of mice extend over more mice generations than would be required in terms of human generations to extend back to the time of the building of the pyramids of Egypt. Her work, which is so monumental and so accurate as to be incontrovertible, has resulted, solely through breeding, in the production of many strains of mice that have never developed tumors in twenty or more generations, in several other strains of mice in which the natural death of all adults is by cancer, and in yet other strains with less degrees of frequency of cancer, but occurring definitely according to the laws of heredity which have been worked out by other observers of the heredity of normal characteristics in animals and plants. The most comforting fact in relation to cancer which Slye's work has shown is that susceptibility to cancer is recessive; that is that it tends to fade out in succeeding generations, while the capacity to resist cancer behaves as a dominant characteristic, tending to become stronger and stronger in successive generations.

Now, may these observations of Slye and other observers on mice and other animals be transferred bodily to the domain of human cancer? In other words, does susceptibility to cancer in man follow the same laws of inheritance that it does in mice? It is beyond doubt that the principles of inheritance are the same in all species of animals as well as in plants. Man is no exception. Cancer in its fundamental respects is the same in man as in other mammals. Therefore, we would seem warranted in concluding that the same laws of heredity which have been shown to hold in spontaneous cancer in the mouse hold also in cancer in human beings. If this is true, why do we not have more evidence of the heredity of susceptibility to cancer in human beings? There is some evidence of inheritance of such susceptibility. There are a few well authenticated instances of cancer families. There are a few well authenticated instances of the occurrence in several members and several generations of a given family of tumors so unusual as to make their identification beyond doubt. On the whole, however, an unusually high incidence of cancer in certain families is very rare. Hunter, who analyzed a few years ago a very large mass of life insurance statistics concerning mortality of insurees whose parents or blood relatives had died from cancer, says, "In no group has there been a higher death rate than the normal from cancer among sons and daughters, brothers and sisters, fathers and mothers of those who died from cancer." This may be explicable, aside from the grounds of outcrosses and inaccurate histories, in the light of Slye's observations, on the theory that in man susceptibility to cancer behaves as it does in mice as a recessive character; that is that it tends to become of less and less frequent occurrence in succeeding generations. In any event, so far as the applicability to man of Slye's observations is concerned, we would seem to be warranted in the advice that intermarriages between families having a high cancer incidence should be avoided.

Besides the studies in heredity just described, most research into the cause of cancer has been along the lines of (a) transplanting cancer from animal to animal; (b) attempts to produce cancer by artificial means; or (c) the study of the chemistry of the body in the presence of cancer as compared with that of normal persons. It may be interesting to review briefly the results that have been accomplished up to the present along these three lines.

As I have said, the universal experience of surgeons and nurses shows that we may care for cancer patients without any probability of contracting the disease or carrying it to others. It has further been shown that there are no well authenticated instances of the direct transference of cancer from husband to wife or the reverse. A few attempts at the experimental transfer of cancer from one person to another by inoculation have been made and some successes of doubtful authenticity reported. There is, however, a very large body of accurate experiments on the transplanation of cancer from animal to animal. Indeed, there are now several strains of tumors originally spontaneous in the mouse that have been transferred with a high percentage of takes through many generations of mice. In rats there are almost as many series of tumors which have been similarly transferred to other rats as there are those that have been observed in mice. A few strains of cancer in the dog have been transferred to other dogs and a few in chickens have been transferred to other chickens. These cover almost all of the successful transplantations from

animal to animal. The studies, however, have been very elaborate and very extensive. A few results of these stand out as more or less well settled.

In the first place it has been found that it is practically impossible to transplant successfully tumors from animals of one species to those of another species. Indeed, in some instances this peculiarity is confined not to species alone, but to varieties. For example, one cancer found originally in Plymouth Rock chickens after a series of transplants now can be reproduced with 100 per cent of success in Plymouth Rocks, but it has not been transplanted successfully to fowls of any other variety. Similarly, certain tumors that were found originally in a certain variety of mice have not been transplanted successfully in any other variety.

In the second place, it has always been much more difficult to transplant successfully tissue from a spontaneously developed cancer to another animal of the same species than to transplant tissue of a transplanted cancer to another animal. After a strain of cancer has been successfully transplanted a few times the percentage of successful takes slowly rises until in many instances almost 100 per cent of successful takes has been obtained.

In the third place, it has been demonstrated positively that besides variations of susceptibility or resistance between species and varieties there is also a very considerable difference in susceptibility as affected by diet. For example, one observer found that mice in Denmark which had been fed on grain were not susceptible to cancer found in mice from Berlin which had been fed on milk. But when the Danish mice were placed on a milk diet they then became susceptible. One man has found that there is an increased resistance to cancer implantation in animals that are not receiving sugar or fats; another that a diet of wheatbread and corn makes mice highly resistant to implantation of cancer. On the whole, however, we do not know now what are the essential factors of diet. It may be stated, however, that we have no experimental evidence that would support or deny the oft heard statement that a meat diet favors cancer. Indeed, this impression is supported by very contradictory clinical evidence. Thus Ross notes that natives of the arctic regions whose diet is all meat or fish are practically free from cancer. The occurrence of cancer among vegetarian Japanese and natives of India is as great as among those groups of the same races who indulge in a mixed diet.

We hear a great deal nowadays about natural and acquired resistance to infections from bacteria. Indeed, the word immunity, as applied for example to diphtheria, is well understood by everyone. Now, can we produce in animals any such thing as immunity to cancer? Needless to say, many experiments have been conducted along this line. Some encouraging results have been obtained. These have been produced in most instances by inoculation of normal tissue cells. Very extensive attempts at treatment of the human subject by vaccine have been made, but the usefulness of these procedures has not been established. Indeed, it is probable that those successful experiments which have occured in mice or rats may be explained by the production, and that for only a brief period, of an inflammatory reaction only.

The chief value that has come so far from the transplanting of cancer from animal to animal has been in the opportunity it has afforded of studying microscopically the effect on the cancer of various methods of treatment. Perhaps the most extensive researches of this sort have been made at the Crocker Institute in connection with Columbia University in New York. Dr. Wood, director of the Institute, recently summed up the results of their years of study along this line by saying that up to the present time no difference has been demonstrated between a cancer cell and a normal cell except that a cancer cell has greater capacity for growth than a normal cell. He adds that thus there can be no expectation of influencing the growth of cancer cells by serums, chemicals, or any other biologic means unless we influence the normal cells of the part to an even greater degree. In other words, you cannot expect to kill cancer cells in the body by any means that will not at the same time kill normal cells of the same kind in the same place. This discouraging result of long-continued studies is offset to a considerable extent by the accurate information which has been obtained by observing the exact effects of various agents, for example *x*-ray and radium, in the killing of both normal and cancer cells locally in the body. This information is now available for the physician and has been of great value in the treatment of cancer of human beings by radium and *x*-ray.

The second phase of the study of cancer which I have mentioned is that of attempts to produce cancer in animals without transplanting to them cancer tissue. These in general have been along

three lines: (a) Attempts to produce cancer by the insertion into the body of animals of bits of normal tissue from some other part in the body of the same animal or of bits of normal tissue from other animals of the same species. Such experiments have been very extensive and varied. They have been almost if not quite universally fruitless. The very few reported successes are probably explicable as the coincidental development of spontaneous cancer in the experimental animal and having nothing to do with the experiment. (b) Many observers have attempted to produce cancer in animals by injecting various irritating chemical substances into or under the skin. Many of these substances, particularly those like certain dyes which have a tendency to dissolve fats, will cause, under these circumstances, an active overgrowth of certain of the cells of the part which microscopically cannot be distinguished from true cancer. These overgrowths of tissue, however, usually tend to get well without killing the animal and usually also without being spontaneously transferred to other parts of the animal's body, as almost always happens in true cancer. In a few instances recently some of these experimentally produced cancers have been kept going by irritation with coal tar or its by-products until they have formed secondary growths in distant parts of the animal's body. Thus it would seem that there has now been produced by this form of experiment the counterpart of the cancers which often arise in chimney sweeps and workers in aniline dye factories which use coal tar. Slosse, of Brussels, has recently reported success in delaying the appearance of experimental tar cancers and in accelerating their absorption by injecting under the skin of the animals salts of certain metals, as copper, lead and magnesium. His work contains a suggestion for treatment of this type of cancer, but of course requires much further study. (c) Other attempts to produce cancer have been made by the introduction into some part of the animal's body of substances which would set up a low grade, but very prolonged, chronic irritation. Fibiger, in Denmark, has succeeded in this manner in producing cancer of the stomach in the rat by feeding rats with the bodies of cockroaches which were infested with a small parasitic worm which imbedded itself in the wall of the rat's stomach where it remained alive or dead long enough to set up an extensive irritation in the stomach which ultimately resulted in true cancer of the stomach. The cancers of the stomach thus produced behave in all respects like spontaneous cancer of the stomach. These results of Fibiger's have been amply confirmed by other observers.

Closely related to these experiments of Fibiger are the more recent ones of Börst and his associates at the University of Munich. They have succeeded in producing cancer-like tumors in rabbits' ears with great regularity by placing various irritating substances in or under the skin of the rabbit's ear and at the same time closely observing the diet of the rabbits and the relation of tumor development thereto. Their observations seem to confirm and extend the observations of Luden, of the Mayo Foundation, on the relationship of certain chemical substances in the blood to the rate of growth of cancer. Luden had previously shown that a substance called cholesterol, which is present normally in the blood of all persons, is greatly increased in amount in either its "burned" or "unburned" form in persons with cancer. Börst found that when he fed cholesterol to rabbits which had irritating substances placed in or under the skin of their ears cancer-like tumors developed much more certainly and much more rapidly than they would after similar inoculations in the ears of rabbits not fed with cholesterol. Further he found that cholesterol-fed rabbits with large tumors of the ear rapidly recovered from the tumors when they were given a diet without cholesterol. This recent observation, confirming and extending as it does observations on the conditions of the blood in human patients with cancer, may be of great significance.

Innumerable experiments have been made in attempts to produce cancer by inoculating animals with bacteria or unidentified germs isolated from cancer. In many instances it has been possible to cultivate bacteria or other unidentified micro-organisms from cancer tissue. Perhaps the most successful productions of tumors from such cultivations are those by Dr. Erwin F. Smith, who has succeeded with great regularity in producing tumors in certain plants by inoculating them with cultures from tumors of other plants. These tumors microscopically closely resemble in all respects certain tumors in animals. Unfortunately for the conclusions from these experiments Dr. Smith has more recently succeeded in producing similar tumors in plants without the use of any injections of bacteria merely by stimulating them by chemical vapors. The most recently reported

experiments of this sort are those by Dr. Nuzum, of Chicago, who reports having apparently succeeded in producing cancers in mice by the frequently repeated injections extending over a long period of time of a strain of bacteria which he has succeeded in cultivating from tissue in a high percentage of cases of cancer of the human breast. Although Nuzum's experiments have been extensive and conscientious, there are too many possibilities of other explanations of his results to warrant their acceptance at present. The most we may say is that they cannot be ignored and are well worthy of repetition by other observers and with additional precautions in order to preclude error.

Perhaps the most important results of all of our animal experiments on cancer lie in the following observations: (a) prolonged, moderate irritation by either chemical or physical agents has been shown to be a well nigh universal factor in all successful productions of cancer or cancer-like growths in animals, and (b) there is a definite relationship between susceptibility to cancer in animals and the body chemistry of the animals.

Are we warranted from this evidence in assuming that chronic irritation is an essential factor in the production of cancer in man? The following are the facts: A history of prolonged, local irritation of the part later affected by cancer is obtained from many patients with cancer. On the other hand, in many other cases, although not nearly as many as in the former group, no such history of the presence of chronic irritation is given by the patient. All we can say then is that the evidence is sufficiently extensive and convincing that cancer often follows local prolonged irritation to warrant us in advising everyone to avoid such irritations, especially of parts of the skin and of glandular organs of the body. We are not warranted, on the other hand, in saying that chronic irritation is the only cause of cancer, or indeed even that it is an essential cause of cancer. We only know that it is frequently associated with, or immediately precedes, the very earliest indication of cancer of the various organs in man, and that it has been shown to be a marked factor in the experimental production of cancer and cancer-like tumors in animals.

What now are the lessons from our present experimental knowledge of cancer which everyone should take to heart? In the first place we must not be dogmatic. We must concede that our knowledge is very incomplete; that it may be inaccurate; that we may be drawing conclusions from our experimental observations that are not warranted when applied to conditions as they exist in human beings. But in view of the fact that cancer strikes down many persons at the period of their greatest value to the community; in view of the suffering of those affected by the disease, and in view of the very high and increasing mortality from cancer, we are warranted in giving the following advice even though future studies may show that the information on which it is based was fundamentally wrong.

1. From what we know of the heredity of the susceptibility to cancer in mice, intermarriage between families in which many cases of cancer have occurred should be avoided. This might even be carried so far that children of one or more cancerous patients should be advised not to marry with the children of one or more cancerous parents of another family. On the other hand, the marriage of persons from noncancerous families with those of cancerous families may be safe, because it has been shown that there is a tendency for susceptibility to cancer to disappear in the progeny of cancerous strains united with noncancerous strains.

2. Chronic irritation of any part of the body, but particularly of the skin or of glandular organs, should not be permitted to continue. This is especially true of chronic irritations as evidenced by chronic sores or bleeding of those parts of the body which are known to be most frequently affected by cancer, as for example the lip, breast, uterus or rectum. The seeking of medical advice as soon as such a chronic irritation is observed is fully warranted even if all our suggestions concerning the possible relationship to cancer are wrong, because such a course would bring to the physician or surgeon much earlier than at present many cancers which neglected would result in suffering and death, but taken early might be cured.

3. All unusual or unexplained lumps or tumors of the body, whether they give evidence of chronic irritation or not, should also be brought to the attention of the family physician as soon as they are observed. If they are not cancer, fear will be removed; if they are cancer, the hope of success of treatment will be greater the earlier they are diagnosed.

When a person suspects that a cancer is forming in some part of the body, it is his or her first duty to go immediately to a competent physician. This

does not necessarily mean a surgeon. There are many physicians who do not operate, but who are quite competent to direct a patient to the nearest surgeon who they think is competent to perform a surgical operation if one is needed. The important thing is not to delay, and, I may add, not to tolerate delay on the part of the occasional physician who unnecessarily procrastinates in his diagnosis. For the greatest hope of success in the cure of cancer lies in early surgical operation. With the exception of a few rare tumors of the sarcoma type which occur in the young, almost every cancer can be cured by early and thorough operation. Indeed, about 25 per cent even of developed cancers are now cured by surgery. The trouble is so many people are unaware of, or wilfully shut their eyes to, the definite warnings that nature gives of the beginnings of cancer, and do not present themselves for diagnosis and treatment until the cancer is not only large locally, but has extended also to other parts of the body.

There has been a great advance in recent years in our treatment of cancer. Thirty-five years ago, Dr. Agnew, Professor of Surgery at the University of Pennsylvania, stated publicly that he had never cured a patient of cancer of the breast. Now, in good clinics, nearly half the patients who have been operated on for cancer of the breast are free from any recurrence of the disease years after the operation. And there has been equal progress made in the treatment of cancer in the other parts of the body. If only public and personal interest in the subject of cancer were sufficiently aroused so that every man and woman would present themselves for examination at the earliest possible suggestion of cancer, we could, in ten years, reduce the mortality to but a fraction of its present rate.

It may not be amiss here to say something concerning the danger which lies in attempts to avoid surgical treatment, our only known means of the cure of cancer, from a foolish fear of the knife. This fear is frequently encouraged and played on by "cancer cure" quacks for their personal gain. There still remains a very widespread popular belief that cancer may be cured by some internal medicine or local application. If everyone realized the fundamental fact that cancer cells cannot be killed except by being removed from the body or by the local application of physical agents such as *x*-ray, radium, and heat, which also kill the normal cells in the same vicinity, there would be no tampering with life, in futile attempts at cure, with agents of any sort the action of which cannot be definitely controlled locally.

It is, of course, possible that some specific vaccine or serum may be found which will so develop the resisting powers of the body that cancer cells will not grow, but such a possibility is highly improbable. In the meantime, the public should feel assured that the medical profession is early and fully aware of the possibilities of every new method of treatment for cancer proposed either publicly or under the guise of secrecy. And there are abundant opportunities in hospitals and research laboratories for everyone to try out any method from which there is a reasonable hope of benefit to the cancer patient. If the cancer patient fully realized this and refused to submit himself to the ministrations of the cancer cure quack, the long list of inoperable cancer cases which come to physicians and surgeons as they say "after having tried all kinds of medicine" would be greatly diminished and thousands of lives would be saved which are now a sacrifice to ignorance and unfounded fear.

BENZYL COMPOUNDS

The Council on Pharmacy and Chemistry reports on the therapeutic status of benzyl compounds. It was shown a few years ago that the papaverine group of opium alkaloids caused relaxation and inhibition of smooth muscle fibre and it was suggested that this action was dependent on the benzyl grouping in the papaverine molecule. This suggested that possibly the same action might be secured from simpler benzyl compounds, and a number of benzyl esters were investigated. Soon the use of benzyl esters in medicine gained considerable vogue. They have been recommended in hypertension, asthma, angina, dysmenorrhea, biliary and renal colic and similar disorders. The Council finds that extensive clinical use does not confirm the enthusiastic estimate of the early advocates. An inquiry addressed to a number of clinicians disclosed an almost unanimous opinion against the value of these preparations so far as most of the recommended uses are concerned. None had seen any action whatsoever in hypertension, nor had the blood pressure been lowered. None of the consultants had seen any effects from the use of benzyl esters in asthma, or in renal or biliary colic. Benzyl esters had apparently given relief in a certain number of cases of dysmenorrhea. A small percentage of patients with angina pectoris appeared to have been benefited by their use; also, a few cases of intestinal colic, which might be explained by a carminative action. *(Journal A. M. A., Dec. 6, 1924, p. 1864.)*

TUBERCULOSIS IN INFANCY*

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It is the purpose of this paper to present the views held today by pathologists and clinicians in Vienna regarding infantile tuberculosis. The etiology, course and prognosis of tuberculosis in infancy are of great importance from the points of view of therapy and prophylaxis. Vienna, the "Tuberculous city," offers innumerable opportunities for the study of this disease. The painstaking, thorough studies of this available material are a revelation to the American student. The ideas and principles emanating from such a source deserve our most critical attention and interest.

As is well known, tuberculosis was considered chiefly a disease of adult life until the establishment of the Pirquet reaction. Investigations by Pirquet, Hamburger, and others have shown that about 85 to 90 per cent of all children have been infected with tuberculosis by the time they attain puberty. Over night, this disease became one of the principal infections of infancy and childhood. Its recognition was one of the great advances in the field of pediatrics.

Gradually more careful statistics became available. Ghon, in his classical researches, showed that about 11 per cent of infants became infected during the first year of life. Hamburger and Sluka found that, in routine post-mortem material, 6 per cent are infected in the first trimester; 17 per cent in the second; 22 per cent during the third and fourth trimesters; 42 per cent during the second year of life and 59 per cent in the third and fourth years of life.

The frequency of infection coincides very closely with the activities of the baby and its association. During the first months of life its contact with the mother and nurse gives the infant little opportunity for the contraction of any infectious disease. As the baby learns to sit up, support itself, and walk about, its field of contact becomes wider and the chances of infection correspondingly greater.

THE MODE OF INFECTION

The mode of infection is of the utmost clinical importance. After years of investigation, we are beginning to understand more completely how the primary infection takes place. The researches of Rietschel have shown that the occurrence of congenital tuberculosis is possible. However, this source of infection is very rare and of slight importance. The patient usually dies during the first few months of life.

The vast majority of cases of tuberculosis are acquired. For many years the mode of entrance of the bacteria was a matter of dispute. With more abundant material and more careful technique we are reaching the conclusion that an extra-uterine, pulmonic infection plays the leading rôle in human tuberculosis.

Ghon and Winternitz have recently reported their analysis of 608 cases of tuberculosis found on the autopsy table. They were able to find anatomical evidence of primary infection in only one case. An analysis of their remaining cases showed that 15 had unmistakable evidence of a primary extra-pulmonic infection. Eleven of these were apparently primary intestinal tuberculosis. Five hundred sixty-seven cases showed definite evidence of a primary pulmonic infection. In fifteen other cases the pathological findings pointed to a primary intestinal or pulmonary infection. Eight cases involved the lung, intestine and head. One case involved the head and intestinal tract only. Ghon thinks that in those cases in which the pathological findings point with equal force to two sources of infection, the pulmonary mode should be preferred. Based upon these studies, he finds that 97.3 per cent of his cases showed a pulmonary infection and 2.7 per cent an extra-pulmonary infection.

Tuberculosis without lung involvement is exceedingly rare. Ghon, in his large series of cases, records only four instances. I had the opportunity of studying a case in Erdheim's clinic where the primary focus was located in the tympanic cavity. The infant, three months old, showed a marked swelling of the post-auricular nodes of the right side. The autopsy demonstrated that these nodes were caseous, with some calcification. A primary infection was definitely established in the right tympanic cavity. The nodes at the bifurcation of the trachea, and the lungs were entirely free of infection. In order to explain the course of events we must assume a tuberculous mother, an infected placenta, amniotic fluid containing tubercle bacilli, aspiration of this fluid into the middle ear and finally the infection of the mucous membrane with the tubercle bacillus.

*Read before the Consulting Medical Staff of the Lymanhurst School for Tuberculous Children, Oct. 28, 1924.

It is an equally unusual course of events that produces other cases of primary extra-pulmonic tuberculous infection. It is important clinically to recognize the enormous percentage of air-borne cases. It is vital from a prophylactic standpoint to take this fact for granted.

CLINICAL COURSE

The newborn infant may become infected with the first breath of air during the first day of life. The primary focus is, however, never localized in the apex, but is usually found in one of the lower lobes. Most commonly, the right lobe is involved, because the right bronchus is straighter and allows the inhaled tubercle bacilli direct access to the right lower lobe. This primary focus is a caseous pneumonia which very often becomes rapidly encapsulated. From the primary focus through the lymphogenous route the regionary lymph nodes in the hilus become involved. This picture is so characteristic that in a post-mortem examination of a child one should examine, first, the tracheobronchial lymph nodes and then the lungs. Three courses may now occur:

1. The primary focus and the infection of the lymph nodes can heal completely and the child continue its existence without any further clinical symptoms.

2. The worst prognosis is afforded in those cases in which the primary focus progresses in size, the lymph nodes in the hilus become greatly enlarged and one finally gets a cavity formation in the lung itself. A caseous miliary or lobular pneumonia can occur. A caseous lobar pneumonia is rare. The end result is always fatal.

3. Most commonly, however, the primary focus becomes encapsulated and the live bacteria remain in the lymph nodes. The child lives and develops. When it reaches puberty an apical infection sets in. In infancy there is no such thing as an apical infection.

An infant can not cough up its sputum. It is swallowed and may cause an intestinal tuberculosis. Intestinal tuberculosis is always alimentary, never hematogenous. The presence of a tuberculous ulcer in the intestinal wall, means an ulcerated focus in the lung. It is very common in infancy.

Enlarged caseous lymph nodes or tuberculous areas in the lung itself may involve neighboring blood vessels. Living tubercle bacilli then find their way into the blood stream. A miliary tuberculosis always results.

In general, then, we may say that tuberculosis in the human being spreads through four routes. The initial infection is erogenous; the hilus infection is lymphogenous; the intestinal infection is alimentary; and the generalized miliary infection is hematogenous.

The constitutional and nutritional condition of the infant apparently plays no part in the frequency of infection. They are important factors, however, in his recovery.

PROGNOSIS

The prognosis of a tuberculous infection in infancy has been subject to some dispute. It is apparent that an early infection is very serious. This is due to a deficiency in anti-body formation. The initial lesion advances rapidly by a contiguous process in the lung. Early caseation or a tuberculous pneumonia with a resulting cavity formation is a common finding. Efforts at healing on the part of the organism are necessarily slow and, for the most part, ineffectual. An early generalization of the tuberculous process is almost characteristic of tuberculosis in infancy.

A short time ago, a hopeless prognosis was given in every case. During recent years, a more favorable stand is gradually being taken by pediatricians.

Lederer reports three striking cases from his clinic in Vienna. The patients were four and a half, ten and eleven months of age respectively, and showed clinical and *x*-ray findings of a pulmonary infection. The tubercle bacilli were demonstrated. Under careful therapeutic regime, these patients have lived for two years and show at present no evidence of an active infection.

Oswald has reported his studies on 135 cases of infant tuberculosis. His total mortality was 65.5 per cent. During the first year of life his statistics showed a mortality of 86.5 per cent; during the second year 10.8 per cent; and during the third year only 2.7 per cent. His prognosis is absolutely fatal in infants under six months of age and becomes rapidly better with the advancing age of the patient.

Hahlo has corroborated Oswald's findings. In a study of forty cases, her total mortality was 75 per cent. Her mortality in infants infected in the first six months of life was 100 per cent. Those infected between the seventh and the fifteenth month showed a mortality of 73 per cent. The prognosis

in cases showing only a positive Pirquet reaction without clinical symptoms was especially good. Scrofula, skin and bone tuberculosis showed a mortality of only 29 per cent.

THERAPY

Therapeutically our only hope lies in a rigid prophylaxis. The newborn infant of a tuberculous mother should be removed immediately after birth. It must be reared in non-tuberculous surroundings. After the second year it may be returned to its mother with much less danger of a fatal outcome. It is realized that the remedy is radical and difficult to accomplish in actual practice. An intelligent co-operation and understanding on the part of the parents is absolutely essential. It is important that they realize the significance of an early infection. With the closest co-operation between physician and parent, prevention of an early infection is assured. This would eliminate another important factor in our infant mortality rate.

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CHLORIN IN RESPIRATORY DISEASES

In New York two clinics were established by the Health Commissioner to determine the efficiency of chlorin inhalations in the treatment of respiratory diseases. These clinics began active work June 1. They continued in operation until August 1, when they were closed because the results were considered unsatisfactory. It is reported that only 6.5 per cent of 506 persons with various respiratory diseases reported themselves as cured. Fifty-three per cent of the patients reported improvement, but the physicians in charge do not attach much importance to such reports since it is well known that patients with minor respiratory infections tend to improve by the very nature of their disease. It is evident that the physician who uses the chlorin treatment in his practice must do so with the distinct understanding that he is using an unestablished method. *(Journal A. M. A., Dec. 6, 1924, p. 1851.)*

OSTEOMYELITIS IN CHILDREN*

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The relative infrequency of acute osteomyelitis in children is largely the cause in my opinion of the many mistakes of early diagnosis. There should be no reason to attribute the local condition to sprains, fractures or dislocations even with the history of trauma, since the systemic and local conditions point clearly to infection. Perhaps to avoid error and delay it is necessary to regard as osteomyelitis all acute febrile cases, especially in children who have pain and inflammatory changes in the region of the epiphysis. (Pfeiffer.[2])

Osteomyelitis is essentially a disease of childhood, but there are two distinct types of osteomyelitis, juvenile and adult. The first is metaphyseal while the second may occur anywhere in the bone. (Gibson.[1])

It is the object of this paper to show especially the pathology which takes place in the bone in acute cases of childhood with such regularity that it may almost be regarded as the rule in acute bone infections of children. The real difference as to the changes or amount of bone destruction depends largely upon the type and virulence of the infection, and slightly upon the condition and anatomical shape of the bone involved. That is, we may have bone infection or destruction without external suppuration as seen in Guerre's disease or Brodie's abscess, or we may have decided change with profuse suppuration.

The causative factors in acute bone infection are *Staphylococcus aureus, Staphylococcus albus, streptococcus, pneumococcus* and occasionally bacillus infection, as the typhoid bacillus. It is obvious that the infection is hematogenous and many conditions, as pustular skin infections, influenza, oral infection, bronchitis, throat infections, may precede the process. Previous illness, exposure, malnutrition and rickets may be predisposing factors.

Infection of bone through incision of bone and surrounding tissue is relatively rare in children, while the opposite is quite true in adults, but in both cases there is a tendency for the condition to be quite localized. Trauma may, through destruction or injury of spongy portions, break down the

*Presented before the annual meeting of the Minnesota State Medical Association, St. Cloud, October, 1924.

internal architecture and destroy or interfere with blood supply, making a lodging place for bacteria and indirectly being the exciting cause of the disease.

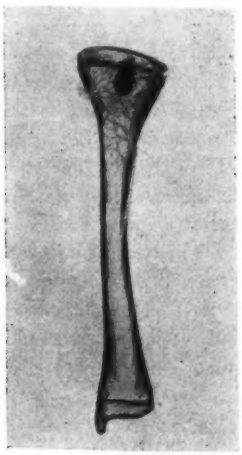

Fig. 1. Drawing showing how infection may become localized, destroy small portion of bone, become a cavity walled off by a definite membrane and become sterile. (Localized abscess.)

Pathology.—Lexer has shown by means of roentgen rays taken of bones in which the nutrient blood vessel had been injected with opaque substance, that there is a rich blood supply adjacent to the epiphyseal cartilages, most of which does not come from the nutrient artery but from vessels which encircle the growing end of the bone and send branches of considerable size direct to the epiphyseal plate and adjacent medulla. These branches break up into numerous wide capillaries in which the blood current is slowed and opportunity is given for the interchange of metabolic substances upon which the growth of bone depends. Nussbaum[3] has demonstrated that these terminal arteries in the metaphysis admit emboli over twenty microns in diameter. This may explain why apparently large masses of bacteria can find lodgment in ends of bones and start infection while they are kept out of arteries elsewhere in the bone. Smaller emboli are washed along, as the arteries are not terminal in either epiphysis or diaphysis.

From Larig's work we have come to accept certain growth coefficients for the various bones of the human skeleton which represent the relative ratio of growth of bones of various epiphyses. The bones possessing the highest growth coefficients are the femur and tibia, and these bones are most frequently affected by osteomyelitis; and even the ends of these bones most frequently affected as shown by Klemm are the ends possessing the most actively growing metaphysis.

After the examination of numerous *x*-ray plates of untreated acute bone infections in children, one can but notice the striking similarity of the infectious process in its beginning as to the manner of its progress and destruction of surrounding tissues. Practically without exception the bone in or near the epiphyseal line is involved because of reasons already stated, and for mechanical reasons because of the anatomical construction of the bone and its blood supply.

Certain changes will take place depending somewhat on the kind and virulence of the infection. Great or small amounts of bone will be destroyed due to interference of circulation, edema, and activity of bacterial products which will necrose and destroy bone. The various changes depending upon causes already explained are as follows:

Fig. 2. Drawing showing general involvement of bone without any attempt of localizing, without producing pus, but destructive to large areas of bone. (Guerre's disease.)

1. The infection may become localized, destroy small portion of bone, become a cavity walled off by a definite membrane and become sterile (localized abscess).

2. There may be a general involvement of bone without any attempt of localizing, without producing pus, but destructive to large areas of bone (Guerre's disease).

3. Involvement with formation of an abscess

and discharge through the epiphyseal line (suppurative epiphysitis, so-called).

4. An abscess may form and involve the entire medullary canal with or without the discharge of pus through some portion of bone.

5. An abscess may form and discharge under the periosteum or through the epiphysis into the joint.

6. A combination in severe cases may result in destruction of ends of bone extending the entire length of the medullary canal, under the periosteum and also into the joint.

Incised wounds, compound fractures and gunshot wound infections may spread by blood and lymph channels under periosteum and through bone, but in children usually tend to remain localized.

Fig. 3. Drawing showing involvement with formation of an abscess and discharge through the epiphyseal line. (Suppurative epiphysitis.)

The diagnosis of acute bone infections.—The clinical symptoms of acute bone infections vary greatly. Pain in bone or near site of bone infection is quite constant and such complaint should not be overlooked on physical examination. The general symptoms of sepsis, chills, sweats, fever, headache, prostration, vomiting, rapid pulse and laboratory findings of a high leukocytosis, accompany the severe case. Local symptoms of pain, swelling, redness and effusion of neighboring joints is constant as the disease progresses. In late cases a local fluctuating abscess may be present. Deep bone percussion is valuable in the early diagnosis. Early high leukocytosis is constant. Blood culture and *x*-ray findings come too late to be of value in the aid of early treatment of the acute case. In later stages in the neglected cases if the child does not die of sepsis we find large abscesses breaking

Fig. 4. Drawing illustrating how an abscess may form and involve the entire medullary canal with or without the discharge of pus through some portion of bone.

down, formation of sequestra and often involvement of joints, and deformities of extremities due to contracture of tissue.

Fig. 5. Drawing showing how an abscess may form and discharge under the periosteum or through the epiphysis into the joint.

Treatment of acute osteomyelitis in children.—Description of the usual pathologic process that takes place in osteomyelitis in children is necessary to complete the essential methods of treatment.

We are agreed that osteomyelitis in children is a disease of the diaphysis of the bone with bone destruction beginning in or near the epiphyseal line. To prevent destruction of the bone, early drainage of the affected part is essential. Upon the first indication of tenderness, redness, swelling, pain upon pressure or pain upon percussion of bone, free drainage should be established. Several incised wounds through the outer tissue and periosteum should be made, then either a portion of the cortex one inch square removed down to the medulla, or, with a large bone drill one-half inch in diameter, the medullary canal exposed. Drainage wounds are always apt to be too small rather than too large and may be placed so as no serious deformity or blemish results. If pus is found, usually gauze or other drainage is not necessary except to keep the flesh wound open; but if no pus is found the cavity may be lightly packed with

Fig. 6. Drawing showing circulation of bone.

sterile gauze and usually within twenty-four hours pus will be found discharging from some of the various openings. Moist dressings, hypochlorite, normal saline or boracic acid may be used as aids to drainage, but discontinued upon any signs of masceration of the skin. A small catheter may be introduced in the opening and Dakin's method used or tidal wave irrigation with various antiseptic

Fig. 7. X-ray showing infection beginning in or near the epiphyseal line and becoming localized.

fluids introduced, but hospitalization is necessary for success in this type of treatment.

In cases which have progressed so the shaft is involved the ends and shaft should be treated in this manner and in our experience in cases forty-eight hours old, in severe grades of infection extension to the shaft has taken place. It has been our experience in many cases that were treated early in this manner to have in a few days all signs of infection subside and in a few weeks to have the various open wounds close and the process become arrested without further bone involvement.

We are seldom able to see acute bone infections early enough to secure ideal results, and treatment of the sub-acute cases with bone destruction are those with which we most frequently deal. After the acute infective stage has passed, evidenced by absence of pain, temperature and leukocyte count, the various discharging sinuses should be kept clean and dry until such time that there is evidence of sequestra formation. This period may be from a few weeks to several months. Upon the evidence of definite formation of sequestra by probe and radiograph examination, radical operation should be considered and should include:

1. Removal of all sequestra.
2. Destruction of cysts and abscesses.

3. Complete drainage.

4. Removal of all possible eburnated involucrum, with poor blood supply.

5. Removal of all protuberances, destruction of depressions or craters so they may be easily covered with soft tissues.

6. Careful stripping and saving of periosteum.

7. Filling of unobliterated cavities with soft tissue.

Prevention of deformity through the use of apparatus is absolutely essential in acute, sub-acute and chronic stages; also after operation when considerable bone has been removed. The non-suppurative types of bone infection often result in bad deformities and should be especially watched and early weight-bearing prevented. Traction should be used in all infected joint cases, especially in the hip, to prevent deformity, dislocation, absorption and to relieve pain and muscle spasm. Walking apparatus is essential in marked involvement either through infection or operation with great loss of substance of bones of lower extremities to prevent deformity.

Interference with growth of extremities.—It is extremely strange why growth of bone is not more frequently interfered with in violent infections, but through the understanding of the bone pathology

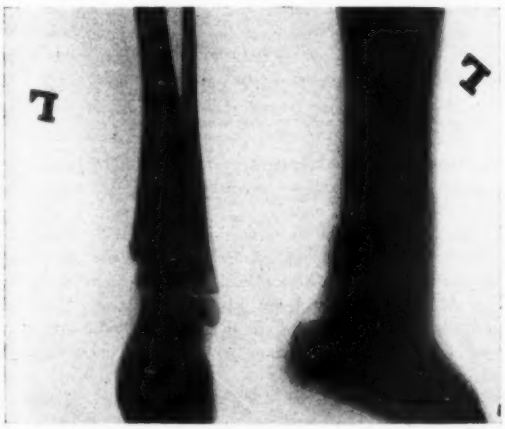

Fig. 8. X-ray showing infection beginning in or near the epiphyseal line, destroying portion of the bone and discharging under the periosteum.

we see that in the greatest number of cases the epiphysis escapes. Through irritation of the epiphysis we have seen the lower limb increase in length as much as three inches with scarcely apparent deformity. Destruction of the epiphysis always results in diminished growth of bone and frequently results in serious deformity and disability. In a young child with proved destruction of grow-

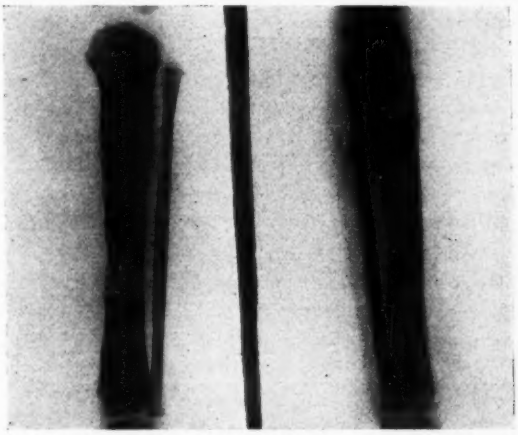

Fig. 9. X-ray showing infection beginning in or near the epiphyseal line involving the entire shaft and discharging under the periosteum.

ing powers of epiphysis, it would be well to destroy the corresponding epiphysis in the well bone to prevent deformity.

CONCLUSIONS

Acute infective osteomyelitis is essentially a disease of childhood and adolescence.

It is absolutely a surgical condition.

The power of bone regeneration in children is almost marvelous.

Early and correct diagnosis for ideal treatment is essential.

Early wide-open complete drainage near the end of the bone is the successful method of treatment.

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DISCUSSION

DR. M. H. TIBBETTS, Duluth: Dr. Chatterton has pointed out the relative infrequency of acute osteomyelitis in children. It seems to me that its relative infrequency in children might be explained to a certain extent. I think it occurs more often than we really diagnose it on account of some difficulty in its diagnosis. Oftentimes the difficulty is due to the profound prostration which the child may have at the start of the disease. The disease is not only a local affair but there is a constitutional reaction which

sometimes overshadows the local osteomyelitis at its place of inception. This is often seen in the type of osteomyelitis that has been so frequently diagnosed as acute epiphysitis, in which one gets high temperature and great prostration. I remember calling to see a child who had a temperature of 104. She was extremely prostrated and

Fig. 10. X-ray showing infection beginning in or near the epiphyseal line destroying the shaft and epiphysis and breaking into the joint.

had a very bad looking throat, and the local sign had been overlooked entirely. The thought was that it was a general systemic infection with profound prostration, but on general examination it was found that one hip was extremely lacking in motion, and so our attention was drawn to that. On account of the limitation of motion of the hip, it was decided, in view of the fact that the temperature was so high and prostration so great, that there might be an osteomyelitis in or near the epiphysis. The child was anesthetized, an incision made, and the neck of the femur exposed. The periosteum was incised and a good deal of pus discharged, so that it was an osteomyelitis in that region. The child promptly recovered after that.

Another thing that often confuses our diagnosis, or is often mistaken for a diagnosis, is tuberculosis. It seems as though that should not be, but I have several times been confronted with cases that had been diagnosed as tuberculosis of the knee, and the child on examination had several sinuses in that leg and some in the other leg, also. I recall one particular case that was brought to my attention as tuberculosis of the knee. Going into the history, I found that the child became acutely ill and soon after that a swelling of the knee and discharge of pus followed. Tuberculosis never starts that way. Tuberculosis of a joint does not come on acutely. This child had an extreme rise of temperature at the time of onset. Tuberculosis of the joint does not start that way. The temperature that you get in tuberculosis is low and intermittent and comes on insidiously.

The next point that I would like to bring up in regard to Dr. Chatterton's paper is what rôle slight trauma plays in the development of acute osteomyelitis. I know as far as the treatment and diagnosis are concerned it has very little significance, but when we come to medicolegal affairs the importance of slight trauma with osteomyelitis developing afterward has to be taken into account. Ely in his recent book, "Inflammation of Bones and Joints," says that the etiological factor of slight trauma has absolutely nothing to do with it; that when we consider the structure of the bone with the hard outer surface and the marrow in the inside, it does not stand to reason that a slight trauma on the outside should have any etiological significance. However, when we consider the fact that some marrow extends into the Haversian canals along with the blood vessels and that a relatively small trauma may block one of these and thus form a lodging place for bacteria that may be in the body, it seems to me this should bear some weight in legal cases.

The Therapeutic Use of Digitalis.—The Council on Pharmacy and Chemistry has long held that digitalis effects can be obtained satisfactorily in most instances by the oral administration of digitalis itself, the tincture or the infusion, and that the intravenous administration of digitalis preparations is rarely necessary. However, investigation indicates that digitalis preparations are administered intravenously far more frequently than seems to be demanded. Because of the importance of digitalis therapy, the Council decided to appoint a committee composed of men who have made a study of questions concerning the administration of digitalis, and to request this committee to prepare a report for publication, which would set forth concisely the limitations of digitalis therapy and the methods of obtaining digitalis effects. At the request of the Council, Drs. G. Canby Robinson, Paul D. White, Cary Eggleston and Robert A. Hatcher prepared a report. This report brings out the indications for the use of digitalis, the limitations of the drug, its dosage and method of administration. It discusses at considerable length the conditions where the intravenous and intramuscular administration of digitalis may be called for and when the oral administration will be found satisfactory. The report concludes with the statement that the oral administration of digitalis in the form of the standardized powdered leaf, infusion or tincture, meets every requirement of digitalis therapy, with the exception of those relatively infrequent cases in which immediate relief is imperatively demanded, or when nausea or vomiting precludes the oral method, and outlines the intravenous, intramuscular or rectal administration of digitalis bodies when the threatening condition of the patient demands immediate relief. (Jour. A. M. A., Aug. 16, 1924, p. 504.)

ARTHROPLASTY*

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The abolishment of motion in an ankylosed joint may be complete, the bony components of the joint being welded into one solid mass and forming bony or true ankylosis, or in cases of false or fibrous ankylosis, there may be slight motion. The question, can mobility be brought about in these ankylosed joints, may be answered in the affirmative. This does not mean, however, that every ankylosed joint may be made to move, nor does it mean that it is desirable to attempt to mobilize every stiff joint. Often function, so far as the patient himself is concerned, is so good that the cost of mobilization, computed in terms of time, pain, discomfort, and so forth, is too great to pay for a result that may be more or less uncertain.

The term "ankylosis" is sometimes erroneously applied to stiff, painful shoulders, sometimes called "glass arm" or "pitcher's arm," to stiff knees following fixation in a plaster cast or splint for fracture of the femur, and to knees with marked limitation of motion following a low-grade arthritis in which there has been no actual erosion of cartilage. The group of cases, however, that form the basis of this paper are not of this type, but are of true bony ankylosis, or fibrous ankylosis, which, so far as function is concerned, is quite as disabling. The few patients with the fibrous type of ankylosis, who were subjected to arthroplasty, had previously been treated by physiotherapeutic measures, or brisement forcé, without benefit. During the last fourteen years, we have performed a few arthroplasties each year in cases that seemed suitable. During these years, certain points have been learned with regard to the joints best suited for arthroplasty, the type of stiff or ankylosed joints that lend themselves best to this plastic operation, the type of person best suited to carry on persistently and faithfully the sometimes painful after-treatment, the best operative technic for each of the different joints, and certain aids in the postoperative and after-care. However, we are performing arthroplasty on only a small percentage of the stiff joints that we see.

Arthroplasty is a plastic operation on an ankylosed joint to permit motion with stability. The old-time excisions of the elbow, shoulder and hip permitted motion, but rarely afforded stability, although the results were often very satisfactory to the patient. Excision of varying amounts of bone is the fundamental principle of all arthroplasty. Nevertheless, strictly speaking, an excision or arthrectomy, even though done to obtain motion where an ankylosed joint previously existed, is not an arthroplasty. An arthroplasty is a refined arthrectomy, carefully planned and carried out, just enough bone being excised to give motion, and the bone ends being remodeled to afford stability.

At the sixth meeting of the International Society of Surgery, held in London in July, 1923, the subject of arthroplasty was discussed. Hey Groves, in his introduction, said that in its broadest sense,

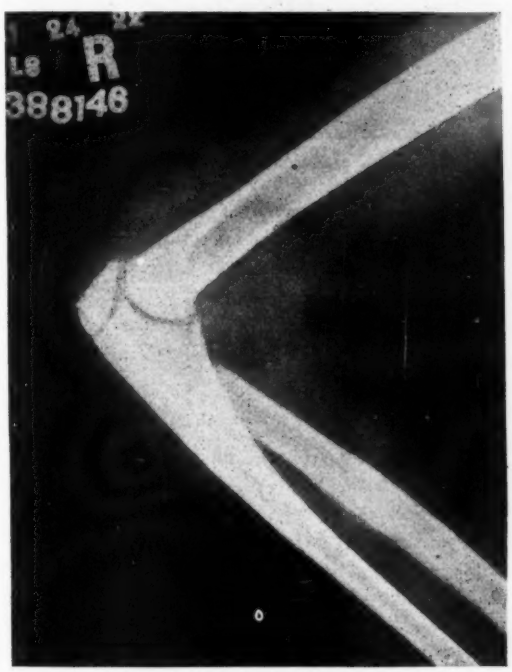

Fig. 1. After arthroplasty for bony ankylosis. Excision of head of radius and remodeling by splitting of olecranon process. Beef bone screw used to reunite olecranon.

arthroplasty may be taken as meaning the operative mobilization of any stiff joint, and will thus include those types of excision which aim at restoring mobility. In America, the term is more restricted. Certainly, if by a "refined" excision, one can get motion with greater stability, let us term

*Read before the Minnesota State Medical Association, St. Cloud, October 8 to 10, 1924.

such operation arthroplastic in contra-distinction to the simpler and more easily executed excisions. The late J. B. Murphy, with characteristic force and optimism, attacked the problem of ankylosed joints.

Fig. 2. Extension after arthroplasty.

He obtained some excellent results from arthroplasty and advocated the operation, knowing that as the experience of different surgeons increased, better results would be obtained. That his enthusiasm was warranted is known by the work of Putti in Italy, and Campbell, Baer and MacAusland in this country.

JOINTS SUITABLE FOR ARTHROPLASTY

The jaw, elbow, knee and hip, in the order named, seem the most suitable for arthroplasty. Good results have been obtained in the shoulder joint, but the cases are too few to permit a definite opinion. Also, the motion of the scapula on the thorax compensates so greatly for the lost motion that the need for the operation is not so imperative as in other joints. The knee would not have been considered more suitable than the hip a year ago, but certain rather excellent results obtained recently have led us to reconsider this point. It must be remembered that arthroplasty is, to a certain extent, still in the developmental stage, and what is apparently true today may not be true tomorrow. After arthroplasty of the hip, the remodeled head of the femur often appears to wear away on use, and insecurity results. Opportunities for observing these cases many years after operation have thus far been rather limited, and it may be found on further experience that this wearing away does not, after all, occur so frequently.

COÖPERATION OF THE PATIENT

It is extremely important that the patient be enthusiastic and eager for the attempt to produce motion in the stiff joint, and that he have the courage and the staying qualities to carry through the after-treatment. In no other type of surgery is the hearty coöperation of the patient so important in obtaining a successful result. He must be persistent and faithful in the effort to bring about motion, bringing into play muscles that have had no function to perform for years. Physiotherapy must be carried on for many months. There often comes a critical point during the convalescence when the joint tends to stiffen, and if movement is not forced thoroughly to the point of tolerance,

Fig. 3. Flexion after arthroplasty.

motion will be lost. Children are, as a rule, poor subjects for arthroplasty. They do not, of course, appreciate the necessity of the persistent after-treatment, and do not tolerate the soreness incident to forcing motion.

TYPE OF JOINT

Of even more importance than the selection of a patient who will "carry on" after operation is the proper selection of the type of stiff joint. Bony ankylosis following the acute infections, in cases

Fig. 4. Bony ankylosis of patella to femur and femur to tibia.

in which all pain, tenderness, thickness and local heat have been absent for at least a year, is the best field for arthroplasty. The danger signals are pain, tenderness, thickening and local heat, and these must be heeded. Fibrous or false ankylosis, under like conditions, probably gives as good results, but in such cases it is more difficult to tell when the zero point in the infection has been reached. It is plainly impossible to appoint a definite time for attempting surgery. I am convinced that most of our poor results were due to operating before the infection was quiescent in the joint itself, or while a generalized arthritis was still active in other joints. Arthroplasty should not be performed until all signs indicate that the process has been quiescent for one year. The same holds true for the post-traumatic joint, a good example being the stiff, painful, almost completely ankylosed elbow that occasionally follows a dislocation with fracture. The callous-forming proclivities of such joints are very great. Before interference, the "green" stage of the callus must have passed, and the mature stage be well established. It is not unusual to wait from eighteen months to three years before such joints are ready for operation. Arthroplasty done in the "green" stage of the callus is doomed to failure. In spite of the fact that some satisfactory results have been obtained, I believe it is better not to attempt the operation on an ankylosis due to tuberculosis, particularly of the hip, as the tuberculosis will flare into activity in a high percentage of cases. Aside from tuberculosis, the type of infection in monarticular ankylosis is unimportant. Gonorrheal ankylosis has been condemned by some as unsuitable for arthroplasty, but it has been my experience in comparatively few cases that if there is no activity and the ankylosis is complete, the results are entirely satisfactory. Gonorrheal arthritis that does not become purulent is sometimes slow to subside, and the quiescent stage is slower in developing than in the septic processes. Consequently, the surgeon may judge from the time elapsed that it is safe to operate, and be disappointed. Although we cannot make definite rules,

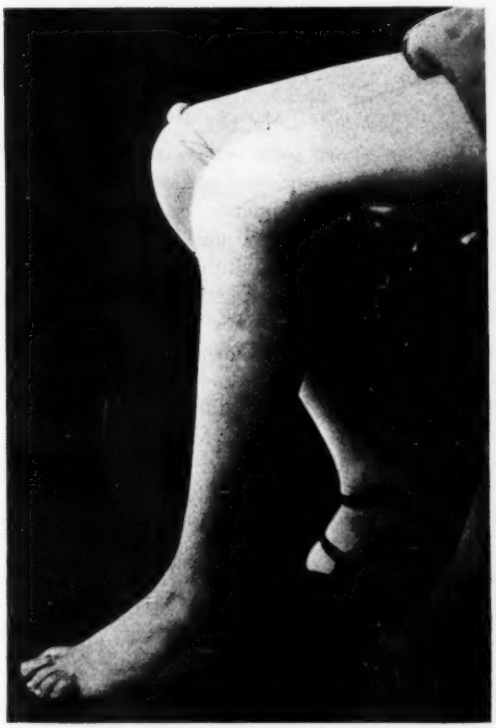

Fig. 5. Voluntary flexion after arthroplasty.

the following points warrant emphasis: (1) avoid the tender, painful, thickened, warm ankylosed joint, whether following sepsis or trauma; (2) avoid the case in which there is multiple joint in-

volvement, if the process is still active in other joints, and (3) avoid tuberculous ankylosed joints. The patient with ankylosis in both knees is entitled to arthroplasty, other things being equal, as is the patient with two stiff hips alone, or with two stiff knees also.

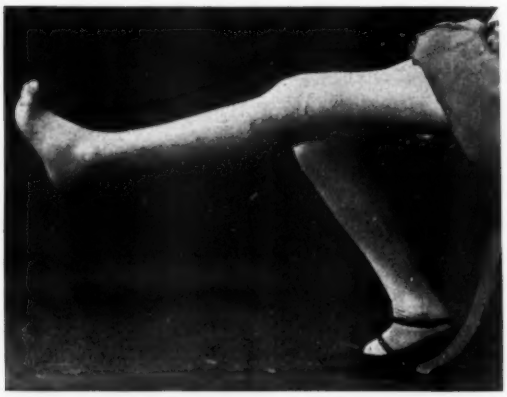

Fig. 6. Voluntary extension after arthroplasty.

OCCUPATIONAL AND ECONOMIC STATUS

If the ankylosed joint is in a suitable position for ordinary uses, and does not interfere seriously with the patient's occupation, surgery should be undertaken only after the most careful consideration, in which the possibilities are placed fairly before the patient. Many patients with ankylosed, but useful limbs, who come to the Mayo Clinic determined to have a joint made movable, lose their enthusiasm when they reckon carefully the time that will be required, and the loss of income during that period. When the ankylosis is in a position which renders function awkward or impossible, the operation may be more readily urged. We must be certain, so far as we can, that the mobility gained will give better service to the patient than would the stiff limb. Many factors enter into making a decision, and each case demands individual consideration. A frank discussion between the patient and the surgeon, based on the latter's experience, and that of other surgeons experienced in the operation, is the basis on which the question of the advisability of arthroplasty must be decided.

GENERAL PRINCIPLES OF OPERATIVE TECHNIC

The object of an arthroplasty is to give the patient a movable joint with stability. Motion can only be obtained by excision of bone. Some means must be taken to prevent the growing together of the bone ends, for the raw surfaces will join readily if left in contact. To prevent union, pedicle flaps, free autogenous fascial coverings of fascia lata, or prepared animal membranes, such as Baer's chromicized pig's bladder, are used according to the preference of the surgeon. In the jaw it is unnecessary to interpose any substance, although this is carefully done by some surgeons. It is sometimes stated that the interposition of a substance between the bone ends is not necessary in any arthroplasty, one of the chief arguments being that the results of excision of the jaw are comparable to the most carefully planned and executed arthroplasty. The anatomic structure and the manner in which the jaw functions, however, change the requirements to a certain extent. In the hip, elbow and knee, interposition of a substance is essential. Occasionally, it is argued that a splendid false joint may occur in the shaft of the humerus, femur, and so forth, when nonunion exists. Here it may well be that the underlying cause of the nonunion was the interposition of a piece of muscle or fascia. False joints do not occur in the spongy bone in the region of the joints, for here it would be difficult for a muscle flap to be interposed, and nonunion is rarely, if ever, seen.

Detailed descriptions of the types of arthroplasty cannot be given here. Campbell, Baer, Putti and MacAusland have given excellent descriptions of their technic.

The operation on the jaw, described in 1918 by New and myself is still used in the Clinic, except that New now uses more care in shaping the neck of the ramus like the normal contour of the head. No fascia or tissue of any sort is interposed. In operating on the elbow, the MacAusland technic is now used. Campbell does not split the olecranon, and avoids the necessity of taking fascia lata from the thigh by using a pedicle flap. We have obtained good results by both methods. The splitting of the olecranon gives a most desirable exposure, and by using a beef bone screw to bring the fragments together on closure, early mobilization is obtained.

Recently we have operated on the hip through the Smith-Peterson incision, turning down the muscles from the iliac bone. The old U-shaped incision, advocated by Murphy, with the chiseling off of the top of the trochanter with its attached muscles, and traction upwards, also affords excellent

exposure. Here again the question of a pedicle flap or a free flap comes up; either may be used. It is difficult to get a pedicle flap that will cover the entire head, but it is easily accomplished with a fascia lata transplant.

We used to use the pedicle flap in operating on the knee, but it is difficult to obtain a flap of the proper size, whereas fascia lata is readily obtained in ample size. The technic of Putti has been adhered to closely; both condyles are remodeled after turning down the patella by cutting through the quadriceps tendon. Campbell has shown that our

Fig. 7. Remodeling of joint surfaces with extension showing joint separation.

attempt to duplicate, as nearly as possible, the anatomic structure by modeling two condyles is not necessary. His excellent results followed the fashioning of one large condyle to fit in the prepared tibial head.

GENERAL PRINCIPLES OF POSTOPERATIVE TREATMENT

Postoperative treatment varies somewhat according to the joint. However, the following general plan may be laid down: Adequate fixation should be provided to prevent dislocation, and to keep the parts quiescent until the blood clot is sufficiently organized to prevent bleeding on motion. Motion should be begun early, usually in about five to seven days, and when it is begun, splints or some apparatus must be used to prevent displacement. Motion must not be forced so as to cause severe pain and discomfort, or the patient will become fearful and discouraged, and his full coöperation be lost. In the weight-bearing joints, the knee and the hip, our results have been definitely better since the postoperative fixation was so arranged that continual traction could be maintained. The splint designed by Jepson has been useful for both the knee and the hip. When the patient reaches the ambulatory stage, a jointed brace at the knee is necessary to prevent lateral strain. There may come a time, about six to nine weeks after operation, when the patient can gain no more motion, is discouraged, and is not making the persistent effort which is essential. Often by anesthetizing the patient, putting the new joint through a full range of motion, and loosening up adhesions, much will be accomplished. The patient can be told that there is good motion present, and this assurance will lead to increased efforts on his part.

REVIEW OF CASES

The group of 142 cases in this series were treated since 1910. In forty-eight arthroplasty of the elbow was performed, in forty-one of the jaw, in thirty-two of the hip, in eighteen of the knee, and in three of the shoulder. As so often happens in a comparatively small series of cases, collected over a period covering a number of years, accurate and detailed postoperative notes are not available in all instances, and when the time comes for a study of the group, memory is not to be relied on. Of the total number, however, definite information was obtained concerning 103, while the records in thirty-nine were so untrustworthy as to make it necessary to chart the results as unknown. There were no deaths following operation. No postoperative shock was evident except in a few hip cases in which the patients were in rather poor condition, and the operation was difficult. Seven infections developed following operation in the 142 cases, six of them being in the hip, and one in the knee. I believe that most of these were due to a lighting up of an old infection rather than to a break in the technic. In the hip, the joint and periarticular structures are so deeply placed that tenderness can-

not be readily elicited by palpation and so detected, as in the knee or elbow.

It is difficult to grade the results, but, for the sake of simplicity, they have been referred to as excellent, good, fair, and poor. For all practical purposes these terms are as definite as any. I wished to determine whether the operation of arthroplasty when performed in selected cases is satisfactory. Therefore, if such an operation on a patient with multiple ankylosis gives, so far as the joint itself is concerned, a good, painless range of motion, the result has been called good. The patient, however, might still be incapacitated, due to involvement of other joints. The age and sex varied somewhat according to the joint involved. Most of the patients were in the third and fourth decades. There were seventy-four females, and sixty-eight males. The sex incidence according to joints was as follows: elbow, eighteen females and thirty males; jaw, twenty-four females and seventeen males; hip, sixteen females and sixteen males; knee, sixteen females and two males; shoulder, no females and three males. The etiology could not always be definitely established, but ninety-two cases were classified as infectious, four as gonorrheal, eleven as tuberculous, and twenty-one as traumatic. The results in the 103 cases were as follows: Forty (38 per cent) excellent; twenty-four (23 per cent) good; twenty (19 per cent) fair; and nineteen (18 per cent) poor. By grouping the excellent, good and fair results (all of these patients certainly were improved by the operation) it will be found that eighty-three (81 per cent) derived distinct benefit, and sixty-four (62 per cent) obtained excellent or good results. None of the patients was made worse. In the elbow (Figs. 1, 2 and 3), of thirty cases traced, the results were excellent in twelve (40 per cent), good in seven, fair in five, and poor in six. In the jaw, of thirty cases traced, the results were excellent in twenty (66 per cent), good in twelve, fair in fourteen, and poor in four. In the hip, of twenty-seven cases traced, the results were excellent in three (11 per cent), good in nine, fair in eight, and poor in seven. In the knee (Figs. 4, 5, 6 and 7), in thirteen cases traced the results were excellent in four (30 per cent), good in four, fair in three, and poor in two; in the shoulder, there was one excellent result and two good ones. With the improved technic of today, and with the greater experience in choosing patients and selecting the opportune time for operation, I feel sure that our recent results are better than these figures indicate.

TABLE 1

RESULTS OF ARTHROPLASTY IN 103 OF 142 CASES

Joint	Excellent	Good	Fair	Poor	Total
Elbow	12	7	5	6	30
Jaw	20	2	4	4	30
Hip	3	9	8	7	27
Knee	4	4	3	2	13
Shoulder	1	2	0	0	3
Total	40	24	20	19	103
Per cent	38	23	19	18	

Excellent and good in 64 (62 per cent)
Satisfactory in 84 (81 per cent)

SUMMARY

Arthroplasty is to be distinguished from arthrectomy in that the former, although a refined excision, has as its object not only the establishment of motion, but stability. Stability is not so important in the upper extremities, but it is extremely so in the lower extremities. The selection of cases is most important. The process which caused the ankylosis must be quiescent not only in the joint involved, but in every other joint. In the traumatic cases, the same holds true as regards the joint involved, and the callus must be matured. The patient must coöperate to the fullest extent and carry out the after-care determinedly. Such coöperation is seldom to be obtained from children. In all joints except the jaw, it is best to interpose some substance, preferably autogenous tissue, to prevent the recurrence of the ankylosis, and in the lower extremity, extension should be applied to separate the joint surfaces until the postoperative reaction has thoroughly subsided, and to permit of early passive motion. Infections developed in seven cases (5 per cent), but no deaths followed operation in this series.

CONCLUSIONS

1. Each case is considered separately, the joint or joints involved, the type of infection, the type of the patient and his economic status, all being prominent factors in the decision as to whether or not arthroplasty should be undertaken.

2. Since 81 per cent of the 103 patients traced obtained satisfactory motion in previously ankylosed joints, and since 64 per cent obtained good

or excellent results, arthroplasty would seem to be a justifiable procedure.

3. Failures to obtain good results from arthroplasty are mostly attributable to a poor selection of cases.

4. The cases in the series were observed during the last fourteen years. There is no doubt that with the present advances in technic and experience in the selection of cases, the percentage of excellent results could be increased.

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DISCUSSION

Dr. Emil S. Geist, Minneapolis: Dr. Henderson is to be congratulated on the excellent results obtained. I think it is in large clinics like that of Rochester that operations of this type should be thoroughly tried out before being done by everybody. The list that Dr. Henderson showed on the last table I think represents the best series of results that I have seen so far. The attitude of a great many orthopedic surgeons is that of "watchful waiting." I looked up to see what Jones and Lovett had to say about arthroplasties. They published a book in 1923. They were still rather skeptical. They say, "Many cases operated upon by various surgeons have been examined by the authors, in the larger proportion of which the joint would have been more useful if it had been left alone." However, they were probably cases that were seen five or six or seven years ago and before the technic had been perfected. It is very hopeful to see the list as presented by Dr. Henderson today.

Simply because a person has a stiff joint does not mean that an arthroplasty is indicated. I had that forcibly brought home to me in my office a few days ago where in two adjoining rooms I had two patients, each with a stiff knee joint. One was a workman, that is to say, he was an automobile salesman, with a stiff knee in a good position. It was stiff; he was walking on it comfortably and it wasn't bothering him, so in his case it seemed to me that he should be left alone. In the other room sat a woman, the wife of a very wealthy merchant who about a year before had been on a trip to New York and who had brought a little present in the shape of a gonococcus and she also had a stiff knee. It was a painless knee; it was somewhat deformed in the sense of flexion. She limped quite a bit and it bothered her a good deal in her society life. A movable knee that she could only use for an hour or two a day would be a boon to her. The operation has not been done yet.

By the way, as this list will have shown you, the weight bearing joints seem to react differently from those that have no weight bearing to do. The results in elbow and the jaw are excellent as Dr. Henderson pointed out, but when it comes to hips and knees the situation is not so simple and that is where we especially desire good results. These latter joints have been the bêtes noires up to now.

It is a wonderful thing to have the operation of arthroplasty to fall back upon. There are certain cases where it must be done. For instance, in the case of the poor individual with two stiff hips. If we can give that person one movable hip and leave one stiff hip or, as I call it, a sitting hip and a standing hip—in such cases of course arthroplasty is absolutely indicated.

Dr. A. R. Colvin (St. Paul): Dr. Henderson's results are excellent, and there is no question about the advisability of doing arthroplasties in suitable cases. Probably if one is at all in doubt about doing an arthroplasty, it should not be done.

I saw several months ago, a man with a splendid result in arthroplasty of the elbow. Yesterday he came for re-examination with a painful joint as the result of attempting to do some work. He had had a very useful stiff elbow. Knowing that he was a laboring man probably he would have been better off if his elbow had been left ankylosed.

In the case of working people, especially in the knee and elbow, a joint ankylosed at a proper angle is, perhaps, in the majority of cases, more useful than one made movable by an arthroplasty.

As Dr. Henderson has said, arthroplasty of the jaw or for that matter mere resection is very satisfactory. I have found the incision along the line of the zygoma working subperiosteally, quite sufficient and free from any danger to the facial nerve.

Dr. M. S. Henderson, Rochester: I have nothing to add particularly but I would like to emphasize what both Dr. Colvin and Dr. Geist touched on, namely, that all stiff or ankylosed joints should not be subjected to arthroplasty. The majority of patients with stiff joints that I see are advised to leave them alone. Some patients are very keen to have the operation, but when they learn of the time they will have to put in, and the time that they will necessarily lose from their work, and when it is pointed out that they already have a useful limb, they will lose their enthusiasm and go home satisfied that they are pretty well off.

SOME PRACTICAL POINTS IN SURGERY OF THE THYROID*

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The purpose of this paper is to bring out some points in the surgery of the thyroid gland without making an attempt to cover such a vast, complex subject completely. In considering the surgical problems of the thyroid intelligently, a thorough understanding of the various disturbances must serve as a foundation. There is no branch in surgery where judgment based on accurate clinical examination and wide experience is more essential than in the division of thyroid surgery.

The diagnosis and treatment of the various forms of goiter are greatly simplified by the use of an orderly classification. Jackson, of Madison, Wisconsin, has broadened the classification of Plummer into the following classes:

1. The colloid goiter
2. The adenoma
   a. with hyperthyroidism (toxic adenoma)
   b. without hyperthyroidism (simple adenoma)
3. The exophthalmic goiter (Basedow's or Grave's disease)
4. Tuberculosis, malignancy, syphilis, thyroiditis, actinomycosis, etc.

The colloid goiter, the first class, is not surgical. The majority of the colloid goiters can be reduced by the administration of iodine or thyroid products and should not receive *x*-ray or radium treatment. Clinically they are symmetrically enlarged and feel soft and granular. Microscopically they show acini filled with colloid material and are lined with flattened epithelium. This type of goiter probably never occurs in persons over thirty-five years of age, but is common during adolescence, especially in girls, appearing either at or following puberty, and usually disappears before the age of twenty-five. The metabolic rate in this class is normal.

The adenomatous goiter, the second class, is a surgical condition. Still the adenomatous goiter should not be operated upon before the patient's growth is completed, for the following reasons: (1) because it seldom becomes toxic during adolescence; (2) because the thyroid gland is greatly needed at this period; (3) because immature adenomata may be left to develop later. After body growth is complete, the adenomata may be removed whether they are toxic or not, and in fact should be on account of the danger that they may become toxic. *X*-ray and radium treatments are of no value. Adenomata occur most commonly in middle life, becoming prominent only when the colloid material subsides. The adenomata are irregular and nodular in conformation. Their consistency depends upon the degenerative process present. Those tumors of the fibrous and calcareous types are hard, while those of the colloid, cystic and hemorrhagic types are soft. Microscopic examination shows the adenomata to be incapsulated by normal thyroid tissue. The acini of the adenomata may be fetal or adult in type, and may contain large quantities of colloid material. Toxic adenomata show no hypertrophy or hyperplasia of the acinal epithelium.

Adenomas rarely cause symptoms of hyperthyroidism before the age of twenty-five, the average age at which toxicity appears being forty-three years. Jackson, of Madison, in a study of four thousand cases of goiter points out that one in every four adenomas becomes toxic before the patient reaches fifty years of age; that one in every five adenomas develops substernal projections; that five women have adenomatous thyroids to every man who has one; and that an adenoma is present on an average of sixteen years before the onset of toxic symptoms. Toxicity is due to degenerative products. At first the toxicity is mild, but it gradually increases. It exerts a selective action on the heart and blood vessels, causing such symptoms as an irregular pulse, attacks of tachycardia, hypertension and later myocardial degeneration, with dyspnea and edema. This degeneration is often permanent on account of the slow progressive hyperthyroidism. Tremor, moist and flushed skin, loss of weight and strength are noted the same as in exophthalmic goiter. The metabolic rate is increased, averaging about plus 38 per cent, but it does not reach the height of the rate of the exophthalmic goiter. After operation the metabolic rate of the formerly toxic goiter patient usually becomes normal. Moreover exophthalmos is absent and acute crises do not occur in the toxic adenomata. Thrills and bruit are rare.

The exophthalmic goiter, the third class, may occur at any period of life. It is most common in

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youth, but has been found in children under ten years of age and in persons over sixty. The onset of the disease is acute. The Basedowian syndrome —tachycardia, flushed and moist skin, tremor, loss of weight and strength—appears early and progresses rapidly. Excessive appetite often accompanies these symptoms. Marked muscular weakness is characteristic, particularly manifested in the quadriceps group. In over 50 per cent of these cases of the third class, exophthalmos develops in the first few months and in over 90 per cent within the first two years. Exophthalmos is not always bilateral. It is the last of the cardinal symptoms to disappear. Exophthalmos frequently remains for a year or two longer on one side following successful treatment.

The pulse of the exophthalmic patient is rapid but regular until late myocardial degeneration occurs. Remissions and exacerbations are typical. Examination of the gland shows it to be symmetrically enlarged and quite hard on palpation. Microscopic examination of the exophthalmic goiter shows that the acinal epithelium is hypertrophied but that very little colloid is present. It is interesting to note that malignancy does not occur in exophthalmic goiter.

During the exacerbations, all the symptoms are intensified and gastro-intestinal crises occur. Fever is often present at this time. The pulse pressure is high with an extremely low diastolic pressure. The basal metabolic rate averages high—from plus 50 to plus 60 per cent. The metabolism test is a very helpful diagnostic aid and an excellent guide in estimating post-operative results.

The treatment, preparation and operation of exophthalmic goiter patients calls for the keenest judgment in those of widest experience. Plummer of Rochester has been the first to call attention to the importance of avoiding operation during periods of severe intoxication and of the necessity in dividing the treatment into operative stages. Operations done during gastric crises are nearly always fatal. Cases of this type should be treated medically by rest, circulatory stimulants, and bromides or opiates. We have within the past year used Lugol's solution, which has markedly reduced the toxicity as manifested by the pulse and the metabolic rate. On the other hand, Lugol's solution and ligation are not indicated in the treatment of toxic adenomata.

Dr. Gustav Schwyzer treats bad risks by single ligation of one upper pole, using local anesthesia or gas. He considers this about three-fourths as severe as double ligation. With the usual improvement, the other side is ligated within a week. Following ligation of one or both upper horns frequently there is observed a marked improvement in a few days. In some cases it takes months. The pulse becomes slower, the purring bruit over the gland diminishes and the extreme nervousness disappears. Increase in body weight is a very important indication of improvement and a very favorable condition for the resection of the gland which is to follow.

In referring to the fourth group of Jackson's classification, namely, tuberculosis, malignancy, syphilis, thyroiditis, actinomycosis, I will not enter into the points of diagnosis. I will only call your attention to the fact that, as disturbances of the thyroid gland, they must be borne in mind in any diagnostic examination. Notwithstanding, many of the simple forms of goiter may often complicate operative procedure on account of the unusual location of the tumor in relation to the trachea. *X*-ray as well as laryngoscopic examinations assist materially in the diagnosis of irregularly situated goiters. In operating the circular, substernal and intrathoracic goiters one must be prepared for hemorrhage and suffocation associated with tracheal collapse. Right here it is well to mention that thyroid resection should never be attempted without having a tracheal cannula boiled with the other instruments. We have had occasion to use it a number of times.

The anesthesia to be used depends upon the operator and the nature of the thyroid disturbance. For the various kinds of simple goiter, as the adenoma, the colloid, the cystic, the cysto-colloid, local anesthesia properly administered has many advantages, such as, in operation upon the weak and aged, for preservation of the recurrent laryngeal nerve, elimination of post-operative nausea and vomiting, and decreasing the chance of post-operative aspiration pneumonia. In operating upon toxic thyroids, however, I believe that nitrous oxide anesthesia has distinct advantages, a very important advantage being the decrease in the time required, and a more important advantage being the decreased psychic disturbance to the patient. In the toxic type of goiter, when the operation is done under general anesthesia, we are often guided by the heart action of the patient during the opera-

tion. When the pulse rate of 120 to 160 comes down under general anesthesia to a rate of 100 it is often only possible at that time to decide whether it will be safe to continue with the ligation on the other side. Similarly the heart acts as a guide in resections of toxic thyroids. In sudden increase of the pulse rate it is often necessary to limit the resection to one lobe.

The technic of goiter surgery has become thoroughly standardized and without describing in detailed steps I will attempt to emphasize certain points that may be of interest but are not often found in print.

In the preparation of the skin, remember that the toxic thyroid is very susceptible to iodine burns and that manipulation—such as massage—of a toxic gland in the pre-operative preparation of the skin should be avoided because of the danger of increasing the absorption of toxins.

The operation for ligation is considered comparatively easy. Still, we have not always found it so. Speed is a very essential factor. The pulse is the best guide in deciding whether both sides should be ligated at one session. Where both upper poles are to be ligated, remember, in planning symmetrical incisions, that the left lobe is somewhat lower than the right. Incision in the skin crease opposite the cricoid cartilage proves to be about the right level. After exposing the upper pole, do not waste too much time isolating the superior thyroid artery. If it is found, we quickly pass a linen suture around it and ligate the artery separately. Whether it is found easily or not, we always pass an empty carrier around the entire pole. The carrier is threaded with a linen and a plain No. 2 catgut suture and the entire pole ligated. The catgut suture is always tightened first, because it permits of more tension, and then the linen is closed in the same groove. Polar ligation prevents a reversal of the circulation that may occur in the anastomotic branches with the inferior thyroid.

In thyroidectomies I wish to stress some of the points in the technic, such as the exposure of the gland, the control of the hemorrhage, the preservation of the recurrent laryngeal nerve, the amount of gland to be removed and the closure of the wound to produce the least visible scar.

In thyroidectomy we use a low Kocher incision, turning the platsma-myoides muscle back with the flap. The division of the two sterno-hyoids is accomplished between the anterior jugular veins. In goiter surgery as in surgery elsewhere, good exposure is important. We divide between two clamps the sterno-hyoids high, as well as the fan shaped sterno-thyroids which lie close to the gland. Before proceeding with the resection we make a firm ligation of both upper poles. This greatly reduces hemorrhage during operation and reduces the danger of secondary post-operative hemorrhage. Care is also taken to ligate the lateral veins before mobilizing the gland.

It is important to stay well within the posterior capsule to avoid the parathyroids and the recurrent laryngeal nerves. The right nerve is more susceptible to injury because of its more anterior course. It is also closely associated with the right inferior thyroid artery, an important point to remember in attempting ligation of this inferior thyroid artery. Simple pinching, pressure, or pulling of the nerve may be sufficient to cause paralysis.

In regard to hemorrhage, it is best controlled during resection by tension on the capsule. Hemorrhage from the substance of the gland is quickly and effectively controlled by slipping the finger behind the posterior capsule and raising the entire lobe forward.

The amount of the gland to be removed depends upon the nature of the gland operated upon. Thyroidectomy for exophthalmic goiter permits of extreme resection. It is asserted that one-sixth of a normal lobe will maintain thyroid function. In non-toxic thyroids some healthy tissue must remain and it is well to remember that the most healthy tissue lies in the region of the upper horns. In this type it is a good plan to leave as much of the capsule as possible, because of the possibilities of the regeneration of normal tissue. Post-operative myxedema is a rare condition, occurring occasionally after several resections on the same case or following resection for carcinoma.

We close the wound with a running suture of catgut in the capsule and in the surface of the gland, following the same by resuturing the cut muscles. In thyroidectomies we drain the majority of our wounds, nevertheless more recently we have closed many without drainage with good results. At this point I wish to call your attention to a most neglected portion of the technic, namely the closure of the skin with reference to the resultant scar. An important pastime of operated thyroid patients is to compare scars. The dread of an ugly

scar is a large factor in the postponement of urgent thyroid surgery. In our work we use a fine running stitch of plain catgut for subcuticular tension. The skin is closed with a fine, non-absorbable suture that is removed in twenty-four to forty-eight hours. The only slightly healed edges are from this time held together with thin gauze collodium strips which cover the entire wound. The patient usually leaves the hospital with two or three small transverse strips, which relieve the tension on the scar.

Close observation and good post-operative care is most essential. Large quantities of fluid intake are important. Many of our toxic cases receive 500 to 1,000 c.c. of saline intravenously before leaving the table. Water is continued by proctoclysis after the patient is put to bed. Digalen has been administered intravenously in 1 c.c. doses in desperate cases with good effect.

Dr. C. H. Mayo warns that often altogether too much is expected from the thyroid operation. He says "operations performed upon advanced cases of hyperthyroidism will not cure fatty degeneration of the heart muscles, nor fatty degeneration of the liver, nor advanced changes in other organs, although the disease may be checked by reducing the toxemia."

We cannot conclude without making some statement comparing the relative values of the exophthalmic thyroid treated by surgery and the same treated by *x*-ray and radium. Statistics show that of those treated surgically approximately 80 per cent continue cured after six years. *X*-ray and radium are contraindicated in every type except in the exophthalmic goiter. Goetsch gives the *x*-ray a place in the treatment of mild cases and in the preparation of severe cases for surgery, but its use may cause loss of valuable time with great increase in the surgical risk. The benefits of *x*-ray treatments should be estimated and controlled with the basal metabolism test.

Thus, summarizing the important factors in the treatment of thyroid disturbances we find them to consist of the need of recognizing the types of thyroid disease, the danger of operating during excessive activity of a toxic gland, the importance of the psychological consideration of the hyperthyroid patient, the need of being prepared to avoid or to treat possible accidents such as hemorrhage or tracheal collapse, and lastly the intelligent post-operative care and observation.

ANESTHESIA IN OPERATIONS ON THE THYROID GLAND AT THE SCHMIEDEN CLINIC IN FRANKKFORT ON MAIN*

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The Minnesota State Medical Association and its President, Dr. Archibald MacLaren, have given me the opportunity to present to this audience some of our experiences in goiter work at the surgical clinic in Frankfort on Main. I wish to thank you, honored colleagues, very cordially.

In our clinic, local anesthesia is regarded as the method of choice in all cases of thyroid operations, except in children and extremely nervous patients.

There is no doubt that local is much safer than general anesthesia. It has the following advantages:

1. No anesthetist working near the operative field, so one of the dangers of asepsis is eliminated.

2. Vomiting, double danger for the wound and heart, happens only exceptionally after local anesthesia.

3. The risk of injury to the recurrent laryngeal nerve is not so great when you are able to watch a disturbance in phonation and to correct it immediately.

4. The advantages are striking in goiter with tracheostenosis, a form of enlargement not seen so frequently in America as in our country. Only those who often operate these forms of goiter will really appreciate local anesthesia. In these cases you may see, after beginning general anesthesia, that the breathing becomes so bad that a tracheotomy must be performed immediately. This is often followed by complications in the healing process of the wound.

For toxic goiters Kocher believed that general anesthesia is a great risk and the cause of some sudden deaths on the operating table. This viewpoint, however, differs radically from the experiences of Enderlen and Kausch in our country and many American operators who recommend general anesthesia especially for exophthalmic goiter.

In the Schmieden Clinic we prefer local anesthesia for these forms, if possible without force,

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and so avoid the excitement which we get in ether anesthesia, which is dangerous to the heart of an exophthalmic goiter patient. But we don't force the patient. His psychic condition is the most important factor. When we see that by his nervousness the first injection of novocain is troublesome we resign all further efforts and employ ether. In the same manner as in Crile's method of anoci-association we demand that every pain and every anxiety of the patient be avoided, the pain being a great exertion and doing to the heart more harm than general anesthesia.

We like two kinds of preparations to get the patient ready for local anesthesia:

1. Psychic; the surgeon has to win the confidence of his patient in the days before the operation.

2. We prepare the patient by heavy doses of morphin and atropin. During the last year we have come to prefer pantopon, which causes much less vomiting than morphin.

Scopolamin, also recommended in the last few years, we do not use. This drug increases the excitement in some patients and in others is fatal on account of the condition of the heart muscle.

The most commonly employed method of local anesthesia which I have seen in America is the terminal infiltration by which the line of incision, the muscles and the tissue around the gland are copiously infiltrated. The method is simple and does not demand special training. But there are disadvantages:

1. The artificial edema causes a distortion of the operative field.

2. Much larger amounts of the novocain are necessary.

3. It is laborious for the operator after the dissection of each layer to inject the next one.

These disadvantages will be avoided by block anesthesia. This form can be given as a separate procedure entirely distinct and before the thyroidectomy. Successive operations can be performed without loss of the operator's time when the anesthesia, as in our clinic, is made in a separate room.

Success of blocking requires a knowledge of the topographic anatomy of the nerves.

Theoretically the field of goiter operation is supplied by the deep and the superficial branches of the cervical plexus formed by the second, third and fourth cervical nerve. The most elegant and logical method is the central block of this cervical plexus. The lateral direct route introduced by Geiger and Haertel, the posterior route of Kappis and Danis and the lateral oblique route recommended in 1924 by Meeker and Hundling (Mayo Clinic) have been tried. All these three methods have the same intention: to inject the anesthetic solution in immediate proximity to the transverse process of the third and fourth cervical vertebræ, where the cervical plexus is formed.

All these three methods are dangerous in the same manner because absorption of novocain may take place in the spinal fluid and paralyze the centers of the medulla oblongata. Sixteen serious intoxications, mostly convulsive seizures and collapses, and three cases of sudden death have been reported. I believe they were caused by absorption of the novocain in the spinal canal. One case of complete permanent paralysis of the left arm occurred which Winterstein ascribed to puncture the dura through an intervertebral foramen and directly injured the cord. That is the reason why since 1921 we have refused in our clinic to use any method of paravertebral anesthesia.

Following a suggestion of Kulenkampff we use block anesthesia as successfully as paravertebral but much more safely. The deep branches of the cervical plexus being largely muscular, it is only necessary to block the superficial branches. These indeed are purely sensory. They form a plexus directly below the fascia on the posterior margin of the sternocleidomastoid muscle. The deep structures of the lateral and anterior regions are supplied by sensory nerves which pass with the superior thyroid artery. We believe that these nerves come from the superior branches of the cervical nerves and follow the sympathetic plexus winding round the artery. They will be blocked by injection close to the superior artery.

Technic.—At each side of the neck we make two dermal wheals: one in the middle of the posterior margin of the sternocleidomastoid and the other above the upper pole of the thyroid lobe. Often you may feel the pulsation of the superior artery at this point. Through the lateral wheal we inject 15 c.c. of 0.5 per cent novocain suprarenin subfascially and the same amount subcutaneously. Through the medial wheal we inject 10 c.c. of the solution subfascially only. By these four injections the whole operative field is absolutely insensible.

We have used this method since 1921; there have been no accidents or inefficiency. The safety of this method is caused by avoiding the proximity of the vertebræ. You must stop after passing the fascia.

The only danger, much greater by the infiltration method, is the injection into blood vessels. By introducing the needle without the syringe you can be absolutely sure of avoiding them, because the entrance of a vessel is easily detected by flowing blood and corrected by changing the position of the needle.

We need only 80 c.c. of a 0.5 per cent solution of novocain. We always add adrenalin. Ochsner, Crile and Mayo advise against the employment of adrenalin in toxic and exophthalmic goiter. They are afraid it may cause a serious Goetsch reaction. But I believe there are two disadvantages. In the last four months I have given the anesthesias for the goiters which Dr. A. J. Ochsner operated personally. First I employed the solution as used in this clinic, i. e., the 0.5 per cent novocain without adrenalin. However, the success of the block anesthesia was not so efficient as it was with adrenalin, and, what is more interesting, the patient without adrenalin sometimes showed more heart and nervous excitement than was seen with the use of adrenalin. So I believe that these symptoms are not caused by the adrenalin but are due to the novocain. Novocain is a mild poison, but it is a poison, and I believe that adrenalin, by delaying the absorption, prevents these symptoms of novocain-poisoning.

CONCLUSIONS

1. In all thyroid operations local anesthesia is the method of choice.

2. The terminal infiltration for goiter operation is simple but has many disadvantages. The anatomy of the neck is such that regional block methods make the operative field absolutely insensible.

3. We don't use the paravertebral methods, they being very dangerous even in the hand of a skillful specialist.

4. The described subfascial block anesthesia by avoiding the proximity of the vertebræ and the cord is without danger and is as successful as the paravertebral methods.

5. We also recommend for exophthalmic goiter the use of adrenalin in the anesthetic solution.

6. We have employed this method, without accident or inefficiency, since 1921.

ARTIFICIAL PNEUMOTHORAX FOR ACUTE LUNG ABSCESS*

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St. Paul

The efficacy of artificial pneumothorax for progressive lung tuberculosis is firmly established beyond any reasonable doubt. Favorable reports without number by careful and critical workers in this country and abroad attest this statement which, therefore, may be accepted as fact.

Another field for this simple but effective therapeutic measure has been opened and found fertile: the field of non-tuberculous suppurative pulmonary lesions. Throughout the literature on pneumothorax therapy are found numerous statements that chronic lung abscess, bronchiectasis, etc., might be amenable to this procedure. The probabilities of collapsing a lung with a chronic abscess are very small, however, because of the almost universal presence of pleural adhesions in cases of more than six weeks' or two months' standing. Thoracctomy and drainage is therefore the method of choice in treating the majority of chronic lung abscesses.

With acute lung abscess (lesions of not more than eight weeks' duration) quite the reverse is true. Pleural adhesions are not likely to form within six or eight weeks, consequently the pleural space is free and the probabilities of being able to attain a satisfactory collapse of the lung are very good indeed. Parenthetically permit me to add here that since the general use of the roentgen ray in chest diagnosis, lung abscesses are being diagnosed much more frequently in the acute stage.

We are indebted to W. D. Tewkesbury[2] for blazing the trail in the use of pneumothorax for acute abscess of the lung. In 1917 he reported two cases cured thereby and has since added twenty-three more. Other men, as Rist,[3] Johnston,[4] Rich,[5] White,[6] Barlow, Kramer[7] and others,[9, 20] have reported their experience with no little enthusiasm. The most recent reference I have found is in the Boston Medical and Surgical Journal for June 5, 1924, where Balboni and Churchill[8] report a cure in an eight year old child.

The technique and dangers of inducing collapse of the lung for abscess differ in no way from that

*Read before the annual meeting of the Minnesota State Medical Association, St. Cloud, Oct. 9, 1924.

used and encountered in treating a tuberculous lung. Thorough use of novocaine undoubtedly guards against pleural shock; perforation of the lung may occur if the operator is not careful at the first inflation; air embolus is also a possibility if

Fig. 1. Advanced unilateral tuberculosis, left lung.

proper attention is not given to the reading of the manometer. Pleural effusion so common with collapsed tuberculous lungs has been conspicuous by its entire absence in my experience in compressing both acute and chronic lung abscesses. When, after an inflation or two, adhesions are found to be present, it is unwise to attempt breaking them by high intra-pleural pressure; much better to discontinue air inflation and resort to surgery. The duration of treatment is six weeks to two months in the usual case.

The advantages of pneumothorax over surgery in treating acute lung abscess must be obvious. There is no operative discomfort or shock; there is no protracted malodorous drainage requiring frequent dressings; there is no resulting chest deformity.

Upper lobe abscesses respond better to collapse therapy than lower lobe lesions for apparent mechanical reasons. Abscesses which have ruptured into a bronchus and those near the root of the lung offer a better prognosis than others, also for obvious reasons. It is probably somewhat dangerous to attempt pneumothorax when the abscessed cavity is immediately subpleural because of the possibility of spontaneous rupture into the pleural cavity with its tragic results.

The rationale of pneumothorax therapy for lung abscess was clearly stated by John B. Murphy[1] in 1898. He said, "I am convinced that abscesses without adhesions and with bronchial communications, should not be treated by incision and drainage through the chest wall, but by producing collapse of the lung by injecting nitrogen gas or a liquid into the pleural cavity, thus compressing the lung and allowing the connective tissue in the wall of the abscess to contract and obliterate the cavity with the aid of the bronchial drain. Allow the wall of the abscess to collapse, to empty thoroughly and it will heal as other abscesses of the same pathologic character; this I believe is the keynote to the successful treatment of pulmonary cavities."

Case Report.—A male, aged 35, with unimportant family and past history, was subjected to tonsillectomy under general anesthesia, March 14, 1922. He left the hospital two days later feeling fairly well, but with an unproductive cough. Three days following this he had severe chest pains and fever 101 degrees and went to bed. His cough became worse and he felt no better. Four weeks after his operation he had a severe coughing spell and raised a cupful of foul sputum. The next week he began hemorrhaging and bled profusely for a week, at the end of which time I saw him. He was somewhat emaciated and racked by constant cough and looked almost moribund. Physical examination was essentially negative except for apparent consolidation of the right upper lobe. Films of his chest

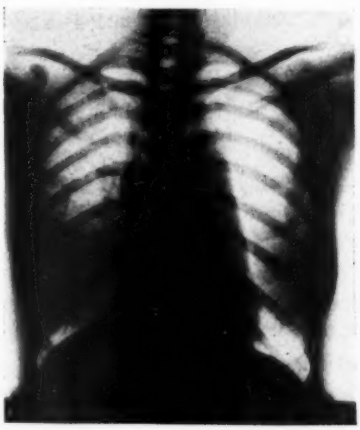

Fig. 2. Same case as Fig. 1 after pneumothorax. Complete collapse effected of left lung.

showed a dense right upper lobe lesion. He had a moderate leucocytosis and no tubercle bacilli in his sputum.

He was given 1,300 c.c. of air into the right pleural space, followed in twelve hours by 700 c.c. more, and in another twelve hours by 500 c.c. more. He stopped bleeding. His cough improved quickly and he had an uneventful convalescence.

Films of his chest six months later showed no signs of past or present pathology. He has been alive, well and working ever since.

Here we have a striking exhibition of the virtue of collapse therapy for acute lung abscess as well as for pulmonary hemorrhage.

My purpose in presenting this short paper is not that I have something quite new to offer. It is rather an attempt to refresh your minds and emphasize that in artificial pneumothorax, a simple, painless, bloodless procedure, we have a brilliant therapeutic measure which has given more than 80 per cent absolute cures in over 100 cases of acute lung abscess.

Fig. 3. Acute abscess upper lobe, right lung.

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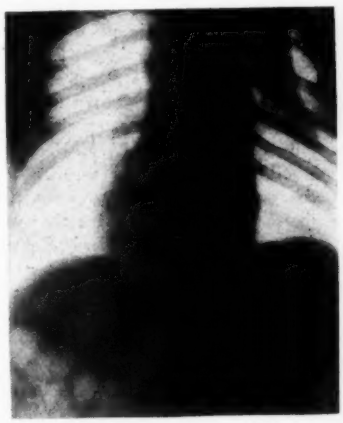

Fig. 4. Same case as Fig. 3 after pneumothorax. Partial collapse of right lung.

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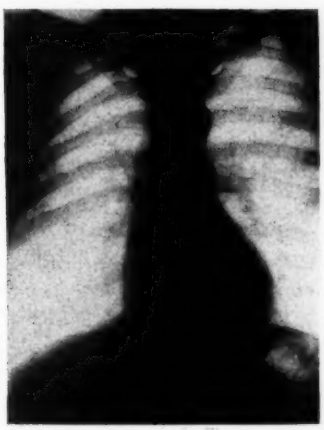

Fig. 5. Same case as in Figs. 3 and 4 six months later. Right lung expanded; no demonstrable pathology.

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DISCUSSION

Dr. W. S. Lemon, Rochester: Doctor Geer has given a brief account of the spectacular recovery of a patient under a rather recent method of treatment. It is applica-

ble to a limited number of patients and is not intended for all types of pulmonary abscess. Forlanini, in 1894, advocated the method, but employed it only for cases of tuberculosis. However, in 1910, he treated a lung abscess of six years' duration and the patient was better after a period of twenty-five months. Murphy, in 1893, advocated the use of pneumothorax, and Doctor Geer has quoted from his paper in which he foretold its use in the treatment of non-tuberculous infections of the lung. In 1917, Tewkesbury used the method, and in his report asserts that until that time tuberculosis only had been so treated, with the exception of a few cases of chronic lung abscess and a case of interlobar empyema reported by A. E. Greer in 1916, in which a cure was obtained in three weeks. He felt that he could advise pneumothorax in acute cases in the hope of reducing the mortality, which at that time was as high as 60 per cent for patients under medical management, with cures of only 10 per cent, and 30 per cent in surgically treated cases, who not only had to face this high mortality, but the possibility of deformity and frequently of persisting sinus.

These percentages have been reduced in recent years with the employment of better methods of technic. We find in Walker's series a medical mortality of 50 per cent and a surgical of 25. In 1919, Hedblom reported sixteen cases of abscess treated surgically at the Mayo Clinic, with a mortality of 18.7 per cent. "All patients were operated on regardless of the fact that several were desperately ill and, therefore, were very poor surgical risks. Operation afforded them the only hope of recovery."

Rich, in 1922, again called attention to pneumothorax as a method of management in acute abscess; he reported ten cases, in eight of which pneumothorax was used. Two patients had recovered spontaneously, and two died during treatment. At that time, if one counts Tewkesbury's cases, twenty had been so treated, with sixteen (80 per cent) complete cures. Rich advocated the early use of pneumothorax, feeling that the best results were obtained in cases in which the lungs were collapsed during the second and fourth weeks, and that the compression should be kept up for at least four weeks.

This method applies particularly to those acute conditions that have not as yet produced sufficient pleuritic adhesions to bind the lung to the chest wall, to the lung abscesses in which hemorrhage is profuse, and to abscesses distant from the periphery, or difficult to localize.

Other types of lung abscess should be treated by various methods. Medical management often results in spontaneous cure; it consists in confining the patient to bed in the open air and on a full, nutritious diet of foods of high caloric content, such as milk, eggs, custard, gelatins, chocolate, and the like. Lockwood advises the use of bicarbonate of soda in doses of from 100 to 120 grains a day, to prevent acidosis, and of glucose in 5 per cent solution every two hours in amounts of eight ounces.

With the medical management should be mentioned the use of salvarsan, particularly for patients who have spirilla or fusiform bacilli in the sputum. Very splendid results have followed the use of salvarsan in these cases.

Medical management also includes Pritchard's method of rest. It also should include the use of the bronchoscope, as advocated by Jackson, Lynah, Yankeur, and others, which accomplishes four purposes: the aspiration of pus from the lung, the irrigation of the cavities with antiseptic solutions, the removal of foreign bodies from the abscessed areas, and, probably best of all, the dilatation of the bronchus leading to the cavity, which is frequently stenosed. This method was used as early as 1860 by Green, who attempted to catheterize abscesses, and to inject directly into the bronchial tube.

While a patient is under medical management for abscess, a postural position should be selected which best evacuates the abscess, and the patient should be encouraged to assume this position several times a day. It is often advisable to use inhalations, preferably of creosote, because of its deodorant qualities and because its irritability prompts cough and complete evacuation. With the reduction of the odor, the patient's appetite improves.

Such medical treatment should be continued indefinitely, provided the patient's general condition and weight improve, the temperature is not elevated, and the amount of cough and sputum is reduced.

However, if patients under medical management fail to improve, and their leukocyte count remains high, then surgical treatment should be resorted to. Early operation is advisable if the abscess is peripheral and well localized, or surrounded by dense fibrous tissue, if it is large and draining badly through the bronchus, or producing such large quantities of pus that there is danger of the patient drowning himself in his sputum, or of the opposite side becoming infected.

GEORGE D. HEAD, M.D., Minneapolis: Mr. Chairman: I was just thinking back over my experience. I am thoroughly convinced that where the drainage through a bronchus is not good, and where the abscess has continued over a period of six months, it is very desirable in a majority of these cases to establish surgical drainage. I have had no experience with the artificial pneumothorax management of these cases. The results shown here today certainly would indicate that we ought to have a wider, a larger and a longer experience on the results of such treatment in these patients.

One factor in the management I wish to call your attention to. It is up to the surgeons to devise a better method of handling these abscesses of the lung than is at present employed. In a number of cases that I have been connected with, the two-step operation method of handling these cases has been used, and I must confess that, so far as I can see, these cases have done the best of any that I have handled. I mean that, instead of making an incision into the abscess and going into the lung through an open pleural cavity, the two surfaces of the pleuræ are stitched together in the first step of the operation and, after the pleuræ have closed, a second operation opens the abscess and the drainage is through a closed fistulous opening. I have seen a number of these abscesses drained through an open pleural cavity and it has always struck me as poor surgery.

DR. M. GEORGE MILAN, Warren: Mr. Chairman: Having in mind the method of Dr. John Ritter of Chicago,

wherein he attempts in the treatment of pulmonary tuberculosis to eliminate and destroy the secondary micro-organisms by means of iodine therapy in the hopes that it would help the lesion to fibrose, I treated a case of pulmonary abscess about a year ago where the patient had been subjected to a pelvic operation and a tonsillectomy on the same day. An upper lobe pulmonary abscess developed. In addition to rest and dietetic treatment, the patient was given small doses of tincture of iodine internally with milk. While on this treatment, the patient showed streaked sputum, which factor led me to discontinue the iodine.

I believe that it was possible that the iodine may have been the etiological factor in the streaked sputum, but, of course, one cannot say this positively. However, I have wondered just how much this treatment had to do with the patient's convalescence. The case made a splendid recovery.

DR. GEER (closing): Mr. Chairman: I was very much interested in looking over the literature from the surgical standpoint to see what the surgeons had to say about the treatment of lung abscesses, and I found that very few of them will admit the fact that pneumothorax should play a very important therapeutic part in the treatment of them. I think the reason is that by the time the lung abscesses get to the surgeons they have become chronic cases in which we can not effect a satisfactory collapse of the lung.

Heuer, of Cincinnati, says that pneumothorax may be used to determine the extent of the adhesions present. It seems to me, if adhesions are not aresent, it would be unwise, at least, not to attempt complete pneumothorax to see if collapse would not do good instead of stitching the pleural cavity to create these adhesions.

In a recent article on lung abscess by Willy-Meyer, it was stated that pneumothorax should be tried first. But the experience of the surgeons has been mostly with chronic lesions and has not been satisfactory. In one case of chronic abscess I tried to break the adhesions by high intra-thoracic pressure. The adhesions pulled off, the abscess ruptured into the pleural cavity. The shock from the toxemia was profound; the patient ran a temperature of 95 and a pulse of 100 for five or six days. She survived it, however, and was operated for the empyema and eventually was cured. That is why I pointed out in my paper, it is exceedingly unwise to attempt high pressure for the relief of adhesions.

But to come back to our subject, acute abscess of the lung without adhesions is a most favorable subject for induced pneumothorax and should be always considered.

Inhalation of "Carbona."—A periodic drinker used the cleaning fluid, "Carbona," to produce unconsciousness when inhaled. Carbona contains carbon tetrachlorid as its essential constituent, carbon disulphid being generally present also. Carbon tetrachlorid has been tried as a general anesthetic and found unsatisfactory. The carbon disulphid greatly increases its toxicity when inhaled. (Jour. A. M. A., Aug. 9, 1924, p. 461.)

BREAD SUBSTITUTES IN DIABETIC DIETS*

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Most erroneous ideas concerning breads and bread substitutes are abroad. Forty-eight of the fifty diabetic patients in our ward received advice from physicians at home that one of the substitutes for white bread listed in Table 1 should be used in place of white bread, the latter being regarded, evidently, as peculiarly injurious, and the substitute as comparatively innocuous. Most of them had had no advice that there was any need of restricting the amount of the substitute. A few had been told to eat a limited amount, but usually the limit was but vaguely understood. Two of the patients were physicians themselves. Because of this widespread misunderstanding, the demonstration in Figure 1 was arranged to illustrate graphically the actual glucose equivalents of like amounts of various breads. The Atwater and Bryant tables of food values were followed, and 5 gm. lumps of sugar were piled like bricks to represent the amount of sugar derivable from 100 gm. each of several kinds of bread and bread substitutes. It will be observed that there is relatively little difference between the size of the piles of sugar.

The least excusable misconception is that dark bread, or graham bread, is relatively innocuous. The fact that the actual carbohydrate content of various breadstuffs does not differ greatly is not realized, nor is there any general appreciation of the rôle played by protein, which, in large part, may be converted by the body into sugar. Thus, in the so-called gluten breads or flours, as the carbohydrate content is reduced by removal of the starch, the proportion of protein is increased, and the total sugar value, so far as the metabolism is concerned, is altered but little.

Gluten flour seems to be the most popular wheat flour substitute. Pure gluten, a sticky, viscous mass, cannot be used to make bread, and the palatability of gluten-flour products is almost in direct proportion to the amount of starch they retain.

*Work done in the Section on Medicine of the Mayo Clinic under the direction of Dr. R. M. Wilder.

Fetterolf, who has analyzed various brands of gluten flour, finds the carbohydrate content of this to vary from 13 per cent to 71 per cent. The latter figure compares favorably with the starch content of white flour (Table 2). The glucose value of certain brands of gluten bread actually exceeds that of white bread (Table 3).

Bran is another popular flour substitute, but the starchiness of bran breads is of as little concern to some doctors as the variations in the color of mulattos. Yet, the baker's variety of bran bread, despite its African complexion, is usually quite as "starchy" and as deadly as its Nordic cousin, the white loaf. If bran is thoroughly washed and made into cakes with agar or fat, the sugar equivalent of the resulting product will be quite low, and the only objection to the use of bran thus prepared will come from its irritative action on the intestine. We have observed cases of badly disordered intestines resulting from the use of bran, and have largely abandoned it.

Physicians who are obtaining the best therapeutic results with diabetic patients emphasize not so much the kind of food that the patient may eat, as the amount. A pound of spinach and an ounce of white bread are equivalents in glucose-yielding capacity. There is no evidence that the one is any "better" as a diabetic food than the other, provided the bread is eaten as slowly as the spinach. Patients and doctors must consider foods and diets quantitatively, and not qualitatively. If a patient's tolerance is adequate for a pound of spinach, but he prefers an ounce of bread, why not bread? But give a bread, the composition of which is known, and give a prescribed amount.

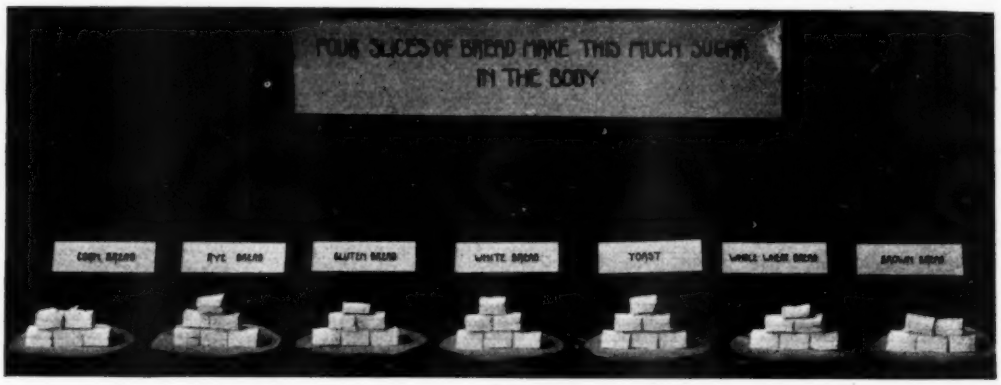

Fig. 1. Relative amounts of sugar produced in the body by corn, rye, gluten, white, whole wheat, and brown breads, and toast.

Table 1

BREAD ADVISED BY HOME PHYSICIANS

Types	Cases
Gluten bread	24
Graham bread	12
Rye bread	12
Whole wheat bread	7
Bran bread	6
Toast	5
Dark bread	1
Brown bread	1
Soda crackers	1

Bread remains the staff of life. However, the tolerance of many patients is too low for bread, and a substitute is often desirable. In such cases, casein flour and soy bean flour are probably the most useful wheat flour substitutes. Ground-up wood, the so-called cellulose flours, are completely without food value and also extremely unpalatable. Casein, being a protein, should be considered as 58 per cent carbohydrate. The soy bean meals contain carbohydrate, but not more than 8 per cent is assimilable. In addition, they contain 20 per cent of protein and 30 per cent of fat and, consequently, are not "innocuous." For the diabetic, food of all kinds is like dynamite, indispensable, but to be handled with due caution.[1]

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TABLE 2

SUGAR VALUE OF GLUTEN FLOURS

(From the analyses of Fetterolf)

Material	Manufacturer	Grams of sugar for each 100 gm. flour	Fat, per cent	Protein, per cent	Carbohydrate, per cent
Pure gluten flour	Battle Creek Sanitarium Food Company, Michigan	57.9	0.9	78.9	12.6
Gluten flour (40 per cent)	Battle Creek Sanitarium Food Company, Michigan	72.9	1.7	39.0	50.1
Self raising gluten flour (40 per cent)	Battle Creek Sanitarium Food Company, Michigan	72.7	1.0	38.6	50.1
Gluten flour (20 per cent)	Battle Creek Sanitarium Food Company, Michigan	80.5	0.7	21.0	68.2
Pure gluten flour "Glutosac"	The Health Food Company, New York	75.3	0.6	35.2	55.0
Gluten flour	Unknown, Danville, N. Y.	79.7	2.5	15.5	70.8
Diabetic flour	Farwell and Rhines, N. Y.	82.8	0.4	11.9	76.4
Diabetic biscuit flour	Unknown	50.2	8.9	75.2	5.8
Plasmon meal	Plasmon Company of America, New York City	45.5	2.7	78.6	0
*Cornmeal		80.9	1.9	9.2	75.4
*Whole wheat flour		79.6	1.9	13.8	71.9
*Wheat flour, graham		79.1	2.2	13.3	71.4
*White flour		80.7	1.0	11.4	75.1
*Rye flour		82.7	0.9	6.8	78.7
*Soy bean meal		26.3	20.0	42.0	0

*Analytic figures from Atwater and Bryant, included in the table for comparison with the gluten preparations.

TABLE 3

SUGAR VALUE OF GLUTEN BREADS

(From the analyses of Fetterolf)

Material	Manufacturer	Glucose equivalent of each 100 gm. bread	Fat, per cent	Protein, per cent	Carbohydrate, per cent
Pure gluten biscuits	Battle Creek Sanitarium Food Company, Michigan	67.2	3.3	43.3	39.0
Gluten biscuit (40 per cent)	Battle Creek Sanitarium Food Company, Michigan	73.0	2.7	36.3	51.9
Potato gluten biscuit	Battle Creek Sanitarium Food Company, Michigan	56.9	2.6	75.6	13.2
Average gluten bread	From figures of Atwater and Bryant	55.0	1.4	9.3	49.8
White bread	From figures of Atwater and Bryant	58.5	1.3	9.2	53.1

THE TREATMENT OF EXTENSIVE INJURIES OF THE SCALP*

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Total or partial avulsions of the scalp, though not of frequent occurrence, are met with occasionally. Total avulsions are not encountered as often as formerly, largely due to the protective devices surrounding machinery; but on farms where women are working around unprotected power-driven apparatus, these accidents still occur, since the hair may become entangled in revolving shafts which tear off the integument. In men, however, with their short hair, these accidents are practically impossible but where automobile accidents are so steadily increasing, one will see victims that have been pushed or pulled over the hard ground to such an extent that large areas of scalp are destroyed and the underlying bone either fractured or scraped until it is no longer viable.

The interest attached to these accidents lies in the difficulty in covering the avulsed parts with skin. Most text-books advocate that the avulsed scalp be put back if the patient is seen early. This is good surgery from a theoretical point of view but practically never successful because of loss of viability, since it is essentially a full thickness pedicle graft without the necessary pedicle. The chief drawback is the lack of a sterile field and the fact that the graft becomes infected, with the result that everything sloughs. Where some of the soft parts remain, granulations spring up and a suitable base for grafting is soon established, but where the bone lies bare and hard, the problem is different. The cranial bones being of a flat type have little power of regeneration after the pericranium is removed, so that the uncovered bone remains in that state for months and years before granulations spring in from the sides, the suture lines, or up from the diploe when the outer portion of the bone has been flaked off after years of work on nature's part. This is a slow, long-drawn-out process, tedious not only to the patient but also to the surgeon.

In the early days when scalping was part of Indian warfare, areas of denuded bone in recovered victims were common and to a frontier surgeon do we owe one of the methods of treatment we pursue. This method was first described by Robertson[1] and later revived by Sneve, Law[2] and Mayo.[3] It consists in drilling many small holes in the outer table of the skull down to the diploe until bloody serum escapes. Through these perforations new granulation tissue springs and covers the bone, furnishing a good vascular base for grafting after a few weeks. Its advantage consists in the rapidity with which granulations form, but its disadvantage lies in the danger of infecting the diploe. This is very remote, however, since the patient is usually immune to the existing infection. On the other hand,

Fig. 1. Case 1. Scalp after complete healing.

where the bone is partially destroyed and so badly impregnated with infected material that drilling through it is hazardous, as in one of my cases, and where it is impossible to sterilize the bone, a better method consists in removing the entire outer table by means of a broad chisel. All the infected material is removed, free drainage results and an excellent growth of granulation tissue whose vascularity is unquestioned covers the area in a few weeks. Adson has used this method in an obstinate case of luetic osteitis of the cranium which resisted

*Presented before the annual meeting of the Minnesota State Medical Association, St. Cloud, October, 1924.

all attempts at healing under specific treatment but which healed promptly after removing the outer table.

When all the areas are covered with healthy tissue, the question of grafting arises. In cases where the patient is seen soon after the accident, McWilliams[4] has recently advocated full thickness skin grafts prepared from the avulsed scalp. Its success depends upon attention to details for there must be perfect hemostasis over the raw areas, while the avulsed scalp must be shaved, cleansed and cut into strips for transplanting, and after transplanting, the graft must be held firmly in place by immovable bandages. The method sounds reasonable and is ideal since it covers the parts with skin that comes from that region. The drawback is the difficulty in cleansing the scalp and in seeing the patient early enough.

Fig. 2. Case 1. Patient wearing wig.

The average case falls into the group where infection is present and denuded bone must be covered by either one of the methods mentioned before. Here, it is necessary to render the tissues reasonably clean. For this purpose, Dakin's solution, when properly used, is the best for it digests all necrotic material besides making the field aseptic; but for a day or two before the expected grafting it should be discontinued and normal saline dressings applied. Besides the use of antiseptic dressings, we have found that free exposure of the granulations to sunlight or a thermolite for two or more hours a day aids materially in shortening the time of sterilization. It promotes an active exudation of serum which is bacteriolytic and which carries the organisms out from the deeper layers onto the surface, where the antiseptics can exert their effect.

Of the grafts, the Thiersch graft is the most practicable, since it covers large areas, and there is always a high percentage of success, provided it is an autogenous graft and the field is free from moisture. In adults, skin from the thigh can be removed under novocain anesthesia with little inconvenience. Masson advocates Thiersch grafts taken from persons belonging to the same blood group. The writer has never tried this method where the patient has been grouped, but he has seen failure in all cases where the graft has been taken at random. Reverdin or pinch grafts may also be used, but they have no advantage over the Thiersch graft. It takes a longer time to get results and the resulting scar is more irregular. Ordinarily, after one or more graftings, the skull is covered, but after a time small areas show themselves where the new skin loses its vitality and a small ulcer results over which the epithelium creeps in from the edges very slowly.

Where the defect is not too large, and especially in children, where we hesitate to resort to frequent grafting under general anesthesia, the adhesive plaster method of Beck is ideal. These plasters, when fastened from the healthy scalp onto the granulations, press down the hard venous ring at the edges and permit the new epithelium to grow in from all sides. The straps may remain two to four weeks between dressings and, even though there is an abundance of pus of bad odor underneath them, the skin seems to thrive. To our aseptic minds, it seems crude, but it is physiologic. Nature, in healing a wound, covers it with a crust made up of wound secretions, which, when dry, presses on the granulation tissue, preventing a venous congestion and allowing the new epithelial cells to creep in. If we pick up such a crust, we invariably find some pus and serum underneath.

This is the counterpart of the use of adhesive plasters. As was stated above, it works well in children, who do not always tolerate frequent dressings.

The observations mentioned above were made on two cases reported below, one being a partial avulsion, while the other was in a fracture of the skull associated with a large denuded area of temporal bone.

Case 1.—N. H., aged 31. July 22, 1922, while washing clothes with a washer run by a gasoline engine, her hair caught in one of the flywheels and the scalp was pulled off the left side of the head. She was immediately brought in by her brother.

There was very little shock, practically no pain, and only a small amount of bleeding. The scalp was completely torn off three-fourths of the head and on the remaining portion was loosened, but not detached. The avulsed area corresponded to a line drawn from the midline posteriorly below the occipital protuberance running to the right to a point about three inches from the midline over the right ear, swinging over the top of the forehead on the right and downward to the left supraorbital prominence and then backward above the left ear, then downward to the point of origin below the occiput. The jagged edges of the remaining scalp were loosened to four inches back and the whole raw area was covered with hair, grease and dirt.

The raw surfaces were cleansed and the remaining portion of the scalp shaved, the lacerated edges were fastened to the loose pericranium to prevent retraction. Normal saline dressings were applied.

The wound was dressed daily with Dakin's solution, the infection cleared up and granulations suitable for grafting appeared. The loosened scalp had adhered and only slight sloughing took place. Over two areas at the temporal and parietal regions of the left side, the pericranium sloughed, leaving dry, white, hard bone.

Aug. 18, 1922, under novocain anesthesia, Thiersch grafts were obtained from both thighs and the entire surface covered, while in the eburnated bone, holes were drilled to the diploe. The majority of the grafts took and granulations began to cover the eburnated bone in three to four weeks. The wound was dressed daily with Dakin's solution. On Aug. 24, she was discharged from the hospital—coming to the office for dressings.

Oct. 1, 1922, she re-entered the hospital and, under novocain anesthesia, more Thiersch grafts were removed from the thigh and placed over the parietal region. She was again discharged from the hospital on Nov. 1, 1922, with scalp healed, except in a few places where the skin would break down. She returned to the office at various times for dressings and was discharged Jan. 3, 1923.

At present, the skin is firm over the scalp, but it is hard to the touch, atrophic in appearance, and has a tendency to scale, while now and then small areas of necrosis appear which heal slowly. She wears a wig and is acting as a telephone girl.

Case 2.—E. H., aged 5. Aug. 18, 1923, while walking across the street with her father, she was struck by an automobile in such a manner that her head was pushed into the gravel. She was carried about fifty feet before the car was stopped.

On examination, she had an area four inches in diameter over the right tempero-parietal area, where there was complete absence of soft parts. The bone was exposed and deeply impregnated with dirt and sand. The patient was in shock, so nothing was done except to treat that condition.

On the following morning, under gas oxygen anesthesia, examination showed the bone as described above and a large part of the temporal muscle gone, while at the lower portion was a linear fracture with a few particles of hair and sand protruding. A decompression was done over the fractured area, and sand to the depth of one-eighth inch lying between the dura and skull was cleaned out. The wound edges were debrided, the whole covered with rubber tissue and wet dressings applied.

Fig. 3. Case 2. Scalp following injury showing eburnated outer table of skull in center.

During the first few days, there was a high temperature and a free discharge of pus, but this gradually cleared up under Dakin's and exposure to the sun. At this time, the writer left for an extended trip and the case was turned over to his associate, Dr. T. Bratrud. On Sept. 29, the wound was clean, but there was no attempt at granulations springing over the bony area. Since the outer table had been so thoroughly ground up by the sand, it was not

deemed advisable to drill holes, but the outer table was chiseled off down to the diploe. This carried away the bone which was potentially infected, leaving a large raw area to granulate. Flamed adhesive straps were applied over the whole denuded portion and the child discharged from the hospital. By Oct. 15 granulation was complete and new straps were applied. She was dressed off and on until Jan. 5, 1924—sometimes retaining the adhesive as long as three and four weeks. There was considerable pus, but epithelization progressed rapidly. On June 5, the wound was completely healed.

Examination June 30 showed the area covered with skin which was smooth, firm and pliable, while at the lower angle was a small pulsating area corresponding to the

Fig. 4. Case 2. Scalp six months later. Complete healing, after removal of outer table.

defect in the bone. The skin showed no tendency to break down and was covered with a fine growth of lanugo hair.

In comparing the two cases, it is felt that in large defects, such as in the first, Thiersch grafts are the proper procedure, and where the bone has been denuded but has no inherent infection, drilling down to the diploe is advisable; but where the soft parts are completely missing and the bone is badly infected, the best thing to do is to remove the outer table to allow granulation. Granulation is much more rapid and its vascularity better than in the former method.

With reference to epithelization in defects not larger than mentioned, especially in children, where one does not like to resort to repeated skin grafting, the use of adhesive straps according to Beck's method is superior to any other. It is probably more time consuming and more uncleanly, but the skin which grows in from the edges is firmer and better. It is made up of cells inherent to that locality, whereas the skin obtained by grafting is thin, has a tendency to scale, and may break down easily, which I think is due to contracture of the connective tissue. This method is not only applicable to scalp and skull wounds, but to any large wound over the body.

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DISCUSSION

Dr. H. P. Ritchie, St. Paul: The point in avulsion of the scalp is that granulations must be present for any epithelial tissue to take hold, and when these show then there is always some amount of infection. The Ollier Thiersch form of the large grafts is the one that meets infection better than the full thickness graft. It is nothing but an outer thin layer of skin and consequently in itself has but little viability and therefore will take hold under circumstances where the full thickness skin graft will fail. The full thickness skin graft requires a clean wound. A small deep graft will also take on granulation surfaces, so that we are practically limited to these two grafts in covering up these surfaces. If the large thick graft (the Krause-Woulfe) is used, it must be anchored by stitches, because it is most elastic, with great tendency to contract. To put this graft under stretch is impossible, as there is usually nothing to sew it to. It is therefore almost excluded from use under these circumstances. I have never seen it mentioned and do not know whether it is possible, but I have wondered if in partial avulsion it would not be possible to use the full thickness skin graft, as the conditions would be exactly the same as those in the forehead, where we use it to substitute tissue removed for other purposes. I think it ought to take. The best graft for these granulating surfaces is the small deep graft of Davis. It takes under any and all conditions and carries but little penalty for failure. At least, it could be used in conjunction with the large thin graft of Ollier Thiersch.

Dr. A. C. Strachauer, Minneapolis: Is there any

additional discussion? If not, I am going to take the privilege of saying a few words. I want to emphasize particularly the importance of the drilling of the external plate of the skull in complete avulsion of the scalp. I would present the picture of a case in which the scalp has been completely pulled off, as by a laundry mangle, and we are confronted with a large, black area of bare bone without even periosteal covering. Following the perforating of the external plate with small drill openings, like a cullender, the granulations come up from the diploe and spread over the denuded surface with surprising rapidity, after which the area may be covered by grafting.

DR. O. N. MELAND, Warren: I just want to emphasize the fact that has been brought out, and that is that these cases are tedious not only for the surgeon, but also for the patient, and any new matter that can be brought out, of course, is welcome. In the first case that was shown, a small piece of the original scalp was transplanted over the eyebrow to make a new eyebrow, and really it looked well, but it failed to take.

CALLS DENTISTRY BRANCH OF MEDICINE—EDUCATIONAL EXPERT SAYS COLLEGES SHOULD RECOGNIZE THE RELATIONSHIP

The next great forward step in dental education should come through placing it on a parity with medical education, dentistry being considered a specialty of medicine dealing with the oral region, diseases of the teeth, and of the tissues immediately adjacent, Dr. William J. Gies said in a recent address at the University of Minnesota. He represents the Carnegie Foundation for the Advancement of Teaching. This is particularly true, Dr. Gies said, because medical men have ignored to a great extent the study of the causes of tooth decay and the afflictions of parts of the body intimately connected with the teeth.

"Antagonism between medicine and dentistry cannot be explained on any basis of public interest or advantage, and has no justification in any sentiments that are worthy of respect," he said, "for both professions are agencies for health service and cannot perform that service faithfully on any other conditions than those of earnest and effective cooperation."

Dr. Gies recommended also that higher intellectual standards be demanded for admission to dentistry, saying that such standards "by making its pecuniary rewards seem too long delayed, would tend to keep out of the dental profession individuals with acute commercial proclivities and strong mechanical bent who would be more useful and more appropriately occupied in one of the mechanical trades than in a profession. This higher educational standard would repel those of low professional instinct, and would attract the high minded men and women to whom professional service makes its strongest appeal."

"Dentistry," said Dr. Gies, "will not be able to meet the full requirements of modern oral health service until dentistry attains the educational quality of medicine, but such educational equality does not require educational identity.

"At present there are 43 dental schools in the United States, thirty-three of which are contained in or affiliated with universities. Only twenty-two of the forty-three schools —one more than a majority—required work in an academic college for admission in September, 1924, at least one year of such work having been first exacted effectually by fourteen schools in 1921 under the leadership of the Dental Faculties Association of American Universities. Minnesota is one of the universities enforcing this requirement.

"Very few practicing dentists in this country have been students in an academic college. Practically all of the graduates of dental schools in this country, including those of 1924, have been trained in institutions where the professional curricula were based on academic requirements from 'possession of a good English education' to graduation from a high school.

"Those who urge that dental education be continued on a high school basis in order to prevent depletion in the supply of dentists and consequent interference with their distribution, also magnify the significance of temporary losses, in the number of new practitioners that usually ensue from the initiation of higher scholastic requirements. They disregard the ultimate gain in number of practitioners that may be expected to follow removal of the stigma that dentistry is an ignorant profession and therefore inferior. They ignore the circumstance that loss in the number of poorly educated and uninspired practitioners would constitute a relative gain for the profession in character, and for the public in quality of oral health service. They fail to appreciate the fact that uniform geographic distribution of dentists is unattainable under any normal social and economic circumstances, and that even overproduction would not enforce such distribution, but would develop congestion in centers of population. In 1900 the number of dentists for each 100,000 of total population was 37; in 1910 the number was 43; in 1920 it was 53. This steady gain in number and percentage of dentists was made on an inclined plane of requirements in both the preliminary and professional phases of dental training."

To this end he recommended increasing the number of pre-professional years in the medical curriculum from one to two.

"Pre-medical and pre-dental curricula could be made practically identical," he continued. "Pre-medical work and pre-dental work in the colleges could be more economically organized in one curriculum than in two."—U. of Minn. News Service, Nov. 6, 1924.

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EDITORIAL

Postmortems

Vienna became the medical center of the world through its adoption of routine postmortem examinations. The Viennese medical authorities, brilliant though they were intellectually, never would have attained their preeminence had it not been for their unusual opportunity for studying pathology. No further argument should be necessary to establish the importance of routine postmortem examinations to medical science and therefore to humanity at large. Even though an autopsy may simply confirm the clinical diagnosis, such confirmation serves to put established facts on a more secure foundation and where the true cause of death is revealed in an obscure instance the value of such a procedure in an educational way is incalculable. A single autopsy might well undermine the assumption of our chiropractic friends as to the cause of disease.

The percentages of autopsies obtained in hospitals in this country vary from zero to one hundred. While the situation has improved somewhat in recent years there is great room for improvement. It is rightly said that the professional standing of a hospital may be accurately gauged by the percentage of autopsies performed.

Numerous factors are responsible for the comparatively poor general showing in this regard. If the hospital management, particularly in public institutions, is not alive to the importance of the problem little can be accomplished. Special attention must be paid to the procedure of carrying out the details of such an examination. Too often the filling out of forms is left to an inexperienced or lazy interne. In case of private patients the physician himself, while the logical one to make the request, too often doubts his own tact in a delicate situation and remains silent. Often the nearest relative of the deceased, from a false sentimentality or misinformation as to religious doctrines, refuses the necessary permission. Permission should be in the form of a request to the hospital authorities for an examination (avoiding the words postmortem or autopsy) to determine the actual cause of death. A progressive physician would never object to being checked up in his clinical diagnosis by a pathological one.

One obstacle in the way of progress along this line is the misunderstanding commonly exhibited between undertakers and the medical profession. The viewpoints of the two professions are absolutely different and we must admit that our profession has very generally shown a disregard for the undertaker's standpoint. An autopsy, no matter how restricted, does make the undertaker's work more difficult.

Our organized state and county societies might well investigate the subject in all its phases just as the Pennsylvania Association has recently done. The report of the committee appointed to investigate the subject is most complete and shows what can be accomplished along this line when an ear-

nest attempt is made. A little publicity work along this line in the way of radio broadcasting or articles in health magazines would be worth something. Although a gruesome subject in general, it is not an uninteresting one to the average layman.

A little co-operation between pathologists and undertakers as to methods of technic which will least interfere with the preparation of the body for funeral services might go a long way towards removing some of the antagonism towards the procedure.

The complete autopsy is doubtless the most scientific procedure and least likely to overlook abnormalities. There is no question but what the complete autopsy renders proper undertaking most difficult. As a matter of fact in an obscure clinical case there are usually certain points the clinician wants cleared up and would give a great deal to have settled. A little co-operation would accomplish much.

Legislation

At the last annual meeting of the House of Delegates of the Minnesota State Medical Association the Legislative Committee of the Association was instructed to attempt again the passage of a bill to reduce the statute of limitations affecting malpractice suits, from six to two years. Acting on these instructions a bill has been submitted to the present legislature with this object in view. A similar bill submitted four years ago was not approved in committee and was therefore not submitted to either house.

The situation today in Minnesota as regards malpractice suits is not at all satisfactory from the standpoint of justice. The actual number of malpractice suits against members of the profession has increased enormously in number and in the amount sued for in recent years. The vast majority of such cases have absolutely no just foundation, and do not get very far. The increase in legal expenses of the State Association of approximately a thousand dollars a year for the last three years in the defense of the comparatively small percentage of such suits handled by the Association is indicative of the seriousness of the situation in Minnesota. If the situation continues insurance rates are bound to go up.

We would not for an instant argue against curtailing the right of a patient to sue when he thinks he has been wronged. That most suits are in the nature of blackmail does not militate against the inherent right of an individual to at least partially correct a wrong done him. The possibility of suits acts as a curb on the careless or inefficient physician or surgeon. Such right should, however, be subject to limitations.

No statistics are available as to the percentage of malpractice cases in Minnesota in which the alleged malpractice occurred over two years previous to the suit. Probably a very small percentage in fact exceed two years. But the existence of the liability for six years from the rendering of professional services constitutes an unnecessary liability which should in justice be removed.

In nine states the statute of limitations is only one year. In such representative states as New York, Massachusetts, Pennsylvania, Illinois, Iowa, Wisconsin and North Dakota the two-year period is in existence. Presumably the two-year period furthers the interests of justice in these states. Why should such a period defeat justice in Minnesota?

Minnesota is one of only five of the forty-eight states of the Union in which the six-year statute applies. Some states have laws specifying the limitation for malpractice suits. Not so in Minnesota. In an editorial which appeared in MINNESOTA MEDICINE in February, 1921, it was pointed out that action for "libel, slander, assault, battery, false imprisonment or other tort resulting in personal injury" must be commenced within two years after the accrual of the cause of action. By another section of the statutes it is provided that actions for "criminal conversation or any other injury to a person or right of action not arising on contract and not hereinafter enumerated" shall be commenced within six years. Some years ago our Supreme Court decreed that actions for personal injuries founded on negligence are governed by the six-year and not the two-year limitation. Malpractice coming under the head of negligence has therefore been construed to come under the six-year limit.

It is difficult to imagine a case with just grounds for malpractice suit in which the condition would not be manifest within two years. Defense of a suit in which services were rendered over two years previous is most difficult. Witnesses in the way of

nurses and other patients are often difficult to locate and the memory of man is less exact the longer the period elapsed.

Members of the medical profession in Minnesota should make a special effort at this particular time to point out to their representatives the injustice of the present situation. Our Legislative Committee is doing its utmost, but only through the concerted action of the profession at large will the legislature be induced to make this much needed change in our statutes.

MISCELLANEOUS

THE PLANS OF THE MEDICAL SCHOOL OF THE UNIVERSITY OF MINNESOTA

E. P. Lyon, Dean

The modern medical school is the result of an evolutionary process extending back more than two centuries. In Germany it grew naturally out of the medieval university by the addition of hospitals and clinics. In England it grew by the addition of laboratories and faculties to long existing hospitals. In America this ideal developed from a rank growth of proprietary schools by an outburst of evolutionary energy supplied largely, during the last twenty years, by the American Medical Association through its Council on Medical Education. In each country the ideal now aimed at by all schools is substantially the same.

This ideal is composed of the following elements:

1. A faculty composed of competent scientists and practical teachers. Some of these, since the thing to be taught is an art as well as a science, should be active practitioners of the art. Others should be men who add to the fund of existing knowledge—research men or productive scholars—in order that the spirit of investigation and discovery may permeate the undergraduate teaching, and in order that graduate students who will be medical teachers later on may receive guidance and inspiration. With the need of a faculty goes the need of adequate support for the faculty.

2. A medical school must have a student body of selected, intelligent men and women, sufficiently old to be able to appreciate the difficult material of which the medical curriculum is composed; sufficiently young to exhibit spontaneity and enthusiasm; sufficiently trained in science to go forward without stumbling; sufficiently broad in culture to appreciate the many-sided interests of their chosen profession. The task of formulating the premedical curriculum is a very difficult one, involving many compromises. The time element has probably been stabilized as the gymnasium course of Europe or two years of college work in America. The best content of the course is perhaps not yet determined.

3. The modern medical school needs teaching and research laboratories for the preclinical sciences and for the clinical departments. The ideal involves well equipped laboratories for general, undergraduate instruction, advanced and special laboratories for graduate instruction and for optional or elective courses, and finally research laboratories for the staff and advanced students. These laboratories must be supplied with the materials necessary for work and with technical and service help.

4. The medical school needs sick people. This means a hospital and an out-patient department. The patients must be used for teaching, and teaching equipment must be at hand. This means, for the best results, that this hospital and dispensary be owned and managed by the school. The number of patients must be sufficient, at least, to illustrate and furnish experience in the common diseases and the common methods of diagnosis and treatment. This means a general hospital of some size. The number of controlled beds usually considered adequate for a student body of one hundred to the class is 500 to 700.

I am here speaking of a hospital where cases can be kept as long as need be for teaching purposes, and where students may spend much time in the study of cases under instructors who are paid to give corresponding time,—a hospital, in other words, which is primarily an educational institution. Other hospitals not controlled or managed by the school but where good medicine is practiced, form useful auxiliaries.

5. A good medical school must have a Public Health department or be so definitely integrated with public health activities that the preventive side of medicine can receive adequate emphasis.

6. The medical school needs an ample library and funds for its support.

7. A first class medical school must have a graduate department, which serves, alike, for the training of future medical teachers, for the training of practitioners in the various specialties, for the promotion of research and—not by any means least—for the reflex effect of advanced work on the undergraduate student body.

All of these elements have come into the requirements of an ideal school because of changing ideals as to methods of medical teaching and learning. The ideal of the medieval university was learning *by hearing*. This ideal survived a long time in America. Many present practitioners were taught chiefly by the lecture method. The ideal of Billroth, fifty years ago, was learning *by seeing* as well as hearing. The amphitheater clinic was the climax of this ideal. The present day ideal is learning *by doing under proper supervision*, as well as hearing and seeing. The student laboratory course, the clerkship, small section clinic and internship are the outcome of this ideal.

The University of Minnesota Medical School is a good school, but it does not yet reach the ideals just sketched. It has definite plans by the fulfillment of which it can approximate these ideals. This article deals with these plans only in so far as they concern buildings, equipment and material resources.

The plan of our Medical School is to have eventually a hospital of 575 beds. It will be a general hospital representing all branches of medicine, surgery and obstetrics. It will be chiefly a free hospital supported by the state and counties for indigent citizens. It will be a pay hospital only to the extent that may be involved in the terms of gifts or that may be necessary to attract the right kind of clinical teachers.

With the completion of the Todd and Cancer pavilions now building, the University Hospital will have about 300 beds. The plan therefore involves the addition of 275 more beds. In these is included a forty-bed Psychopathic Hospital, which has been asked for as a separate item from the last two legislatures, and is greatly needed as a service institution in this state. Also in the 575 beds is included an acute orthopedic unit to go on the campus as part of the greater establishment for crippled children, made possible by the magnificent gifts of William Eustis.

When the University Hospital is expanded the administrative and service facilities must also be expanded. The plans include an administration building and an addition to the service building.

The school has a well-attended dispensary, but it is in temporary and unsatisfactory quarters. The plan calls for a dispensary building to house this very important part of the work of medical teaching.

The school has two laboratory buildings, but neither is complete. The plan includes the building of the lacking wings of Millard Hall and the Institute of Anatomy. It may be added that there is great need of these additions now, for in the last few years the student body has more than doubled, two important departments formerly housed elsewhere have been placed in these buildings, the dispensary has been brought from an old building across the river to the basement of Millard Hall, and space has been found also for a new department, that of Preventive Medicine and Public Health. The present laboratories are all overcrowded.

The school must have a nurses' building, and this is an important item of our plan. At present the nurses are living in old houses and flat buildings, part of which have to be rented by the University. The health and efficiency of the nurses demand better housing.

The school needs a larger library. Since the plan was formulated, the medical library has been adequately housed in the new Library Building, which is a credit to the University and to the State of Minnesota. But we need money for books, sets of periodicals and journals.

The present departments need equipment and the proposed additions will need equipment. The plan includes items for these necessities and for clinical laboratories.

All the foregoing the Medical School of the University of Minnesota needs to fulfill the universally accepted standard or ideal of a first class school; or—if you prefer a material illustration—to make this school the equal of Michigan or Iowa, or any of the leading medical schools of the country.

But the situation of this school is unique and the time is unique. Foresight and wisdom have presented the opportunity to make here a school of super-ideals.

The City of Minneapolis must eventually have a new city hospital. The present city hospital has for many years furnished valuable teaching opportunities to the Medical School, as has also the Ancker Hospital of St. Paul. In both cases the work has been handicapped by distance.

It is time now to take a long look into the future. It is time to think of what Minnesota will be medically one hundred years hence.

If the proposed new hospital of the City of Minneapolis should be located at a considerable distance from the University, its capabilities as a teaching and research institution would be permanently diminished. They might even be largely lost. On the other hand if this hospital could be placed near the University Hospital, its value as a center of teaching and medical science would be forever conserved and might increase as time goes on.

Medical men need not be reminded of the advantages to both undergraduate and postgraduate teaching accruing from the proximity of such a city hospital to the state hospital. Not only would the added beds furnish a greater variety and number of cases, but a municipal hospital will always present more acute diseases, accident and emergency conditions, contagious diseases and obstetric cases than a hospital drawing from the state at large.

Teaching and research contribute to the understanding and care of patients. Therefore that vital matter is tied up with the question of location of this hospital.

It is *not* the plan of the University to build the city hospital, support the city hospital, manage the city hospital, control the city hospital, or in any way change existing arrangements.

It is the plan of the University to conserve and perpetuate the scientific and teaching values of the city hospital by furnishing a site for that hospital near the medical school. The University believes that such a location would contribute alike to the welfare of the Medical School and the welfare of the City Hospital. It believes that such a geographical concentration of material, facilities and personnel would make Minnesota an important clinical center.

These are the plans of the University for the completion of an adequate physical plant for the Medical School and the conservation of the teaching opportunities of the community.

The estimated costs amount to $3,600,000.

Does this seem a large plan? Does it, perchance, appear to some readers as unnecessarily large and expensive?

It was to anticipate such questions that I introduced this article with a statement of the present day ideals of a medical school and of the educational ideals which underlie such a school. But perhaps some comparisons may make the subject clearer.

The University of Iowa is spending just now the sum of $4,500,000 on its medical school, as additions to considerable facilities already existing. The University of Michigan, at a cost, I am told, of $5,000,000, has built an 800-bed hospital on foundations planned eventually to carry 1,200 beds. That University is now planning extensive new laboratories which will cost a large sum.

Columbia University has issued a prospectus concerning the new medical school and Presbyterian Hospital and states that the first unit of the medical center, as planned, will cost $10,000,000.

Other examples could be cited, but the above are sufficient to show that our plans are not extravagant.

There are three thoughts to keep in mind in this connection:

1. The method of teaching by lectures seemed cheap, while the method of teaching by doing under supervision seems expensive. It seems expensive because it demands a large clinical material accumulated in one place. But bear in mind that no one ever learned any art except by doing. Under the former cheap form of medical education the graduate had to learn by doing after he got out into practice, there was no supervision, and the public had to pay the bill in more ways than one. The new plan costs no more in the aggregate, and the results are better both for medical education and for the public welfare.

2. The University Hospital seems a very expensive educational establishment. While erected and maintained, from our standpoint, for educational purposes, it has nevertheless a by-product in service rendered which is worth the cost. The poor and unfortunate must be cared for in any case. Before there was a University Hospital counties sent patients to other hospitals and paid the bills. Again, while the cost seems high, it is because it is concentrated where you can see and count it. The by-product justifies the whole bill and the by-product costs no more than equal scattered service would cost.

3. The University does not expect to realize its plans immediately—in fact does not desire to realize them too rapidly. It wishes to look ahead to something symmetrical and adequate. But it expects ten or more years to elapse before the entire plan is realized, hence the costs will be distributed over a long time.

Bear these thoughts in mind as you consider the remainder of this paper.

The foregoing plans and the estimate, with the formal approval of the Board of Regents of the University, were presented by President Coffman to the Rockefeller Foundation and the General Education Board of New York. These organizations sent special investigators to go into all questions involved. Acting upon the advice of these investigators the trustees of these foundations approved the plans. The Rockefeller Foundation found itself unable to participate; and by arrangement between the two organizations, the General Education Board took over the entire project and now offers to the University of Minnesota the sum of $1,250,000 toward the realization of the University's plans for medical education, on condition that the University, from public or private sources or both, shall raise the balance of $2,350,000. This is in keeping with the present policy of the Rockefeller Boards to finance to the extent of one-third the projects they go into.

There is no other condition whatsoever attached to this offer.

The goal is in sight. If the medical men of the state act strongly and unitedly they can push through to a great victory, and it will be their victory, that of their profession—their heritage and that of their descendants.

Let me ask what the manufacturers and merchants would do if it was proposed to erect a factory costing $3,600,000. What the factory would be to business interests, an adequate medical teaching and research center in the Northwest would be to the practitioners of medicine.

The plan lends itself admirably to donations for memorial purposes. The nurses' home, the children's pavilion, the women's hospital, the infirmary, the clinical laboratories, solaria, wards, rooms, beds—any or all might bear the names of donors or the names of those whom such donors wished to honor. The medical profession can help by presenting this idea wherever possible, particularly from the standpoint of the service to be rendered the sick and unfortunate.

The state and citizens need to catch a vision of values alike in health, education and prestige to be realized in these plans. The medical profession can further the plans by telling the people of the advantages to be gained.

The united support of the medical profession will "put the ball over."

OBITUARY

DR. CHELSEA C. PRATT

Dr. Chelsea Carroll Pratt, of Mankato, died at his home Saturday, December 20, 1924.

Dr. Pratt was born in Chippewa Falls, Wisconsin, in 1877. He received his degree in Medicine from the University of Minnesota in 1905 and served on the faculty of that institution for a time. He was later a member of the faculty of the University of North Dakota. He had been a member of the Mankato Clinic for a number of years preceding his death. During the World War, Dr. Pratt served in France and Montenegro.

Surviving are his widow, two sons, his mother, sister and brothers.

The esteem in which Dr. Pratt was held among his fellow practitioners is well acknowledged in the following memorial:

IN MEMORIAM

DR. CHELSEA C. PRATT

We bow in humble submission to the will of the Divine Creator in removing from us by death our esteemed friend and fellow worker, Dr. Chelsea C. Pratt; yet we mourn the fact that he was stricken down in the zenith of a life of activity and usefulness. Therefore, be it resolved by Blue Earth County Medical Society in regular session assembled:

1. That we deeply regret his demise, and shall miss his genial fellowship, his efficient work amongst us, his ethical character and untiring zeal for the good of the profession.

2. That we extol and honor his memory for his unflinching devotion to duty in the service of his country in time of national stress, and for the remarkable courage and cheerful spirit which he revealed during his last illness, even though he was fully aware of its hopelessness.

3. That we express to the bereaved family our condolence and sympathy.

4. That a copy of these resolutions be spread upon the minutes of our society, that a copy be sent to the family and one to each of the state medical journals.

J. W. Andrews,
H. J. Lloyd,
A. V. Denman.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

MINNESOTA STATE MEDICAL ASSOCIATION

A joint meeting of the Section on Surgery and the Section on Medicine of the Minnesota State Medical Association with members from the Hennepin County Medical Society was held in Minneapolis, January 10th, to consider arrangements for the program of the annual meeting, April 27th, 28th and 29th.

Dr. L. A. Rowntree, Rochester, chairman of the Section on Medicine, Dr. Harry P. Ritchie, Saint Paul, chairman of the Section on Surgery, and the Hennepin County Medical Society represented by Drs. W. A. Jones, A. S. Hamilton, C. B. Wright and N. O. Pearce, were present.

Indications are that this meeting will be one of unusual interest. It was agreed to commence the meetings at 8:00 o'clock A. M. and 2:00 o'clock P. M., and that they be held at the University of Minnesota.

The Clinical Section of the Hennepin County Medical Society generously offered to provide all clinical material for this meeting. This is the time that clinical week is usually held in Minneapolis.

Dr. Wm. David Haggard, president of the American Medical Association, Dr. Frank Billings, and Dr. Wm. C. Woodward are to be invited as speakers and guests.

Monday evening will be devoted to the consideration of medical economic subjects. The visiting guests will be speakers. Tuesday morning is to be devoted to clinical demonstrations of lymph nodes, tumors of the breast and bones. Wednesday morning another joint clinical meeting will be held on diseases of the glands of internal secretion and neurology.

The two afternoons are to be devoted to papers. Invitations will be extended for papers on a few selected subjects. It is requested that all those desiring to present papers before this meeting turn them in immediately to the chairmen of their respective sections.

CLINIC TOUR OF THE INTER-STATE POST-GRADUATE ASSEMBLY

Last year members of the American Bar took a trip abroad and this year a somewhat similar voyage is to be made by physicians under the direction of the Managing Director's office of this very live association with headquarters at Freeport, Illinois.

The only qualification required is membership in a State or Provincial society. The family of such a physician is eligible. Clinics in all the specialties are to be offered this group of American doctors at numerous medical centers in Canada, England and France. Extension tours to the principal medical centers in Europe may be arranged in addition.

The tour starts from Chicago, May 17th, and the first clinics are scheduled for Toronto May 18th and 19th. The Toronto clinics will be conducted by the medical faculty of the Toronto University and in Montreal by the McGill faculty.

Sailing from Montreal a professional program conducted by some of the foremost men of the profession is being arranged while on the water. Landing in Liverpool May 31st, the first week in June will be spent at the various hospitals in London.

Numerous social functions in the form of receptions and luncheons will be given the visiting physicians by the Lord Mayor of London and the presidents of the Royal Societies of Medicine and Surgery, among others. Intensive professional programs will be carried on while in London.

The tour will include Liverpool, Manchester, Leeds, Dublin, Belfast, Glasgow, Edinburgh, Newcastle. The week of June 22nd to 27th will be spent in Paris. The clinics in Paris are to be arranged by some of the most eminent members of the profession in that city and receptions will be given the visitors by the Academy of Medicine and the Municipal Council of Paris.

The party will return to this country after the week in Paris. Prices for the tour as outlined vary from $635 to $990 per individual depending on accommodations preferred. Here is an opportunity to visit some of the well known medical centers in professional company and with plenty of pleasant relaxation interspersed. Regular tour arrangements care for the bothersome details.

For further information and reservations, write Dr. W. B. Peck, Freeport, Illinois.

LYMANHURST AND PARKVIEW STAFF MEETING

The following program will be presented before the regular meeting of the Consulting Medical Staff of the Lymanhurst School for Tuberculous Children at 7:00 o'clock, Tuesday evening, February 24, in the Lymanhurst School, 1800 Chicago Avenue, Minneapolis:

"Types of Tuberculosis Causing Death in Minnesota Children" .....Dr. Ruth Boynton

"Genital Tuberculosis".....Dr. F. L. Adair

"Further Studies on the Height, Weight and Pondral Index in Suspected Tuberculous Children" .....Dr. R. E. Scammon

All persons interested in tuberculosis are invited to attend these meetings and participate in the discussions.

FREEBORN COUNTY MEDICAL SOCIETY

The annual meeting of the Freeborn County Medical Society was held at Albert Lea, Wednesday, December 17. The following officers were elected for the coming year: President, Dr. J. P. Von Berg, Albert Lea; vice-president, Dr. W. L. Palmer, Albert Lea; secretary, Dr. J. W. Gamble, Albert Lea, and treasurer, Dr. J. R. Nannestad, Albert Lea.

A round table discussion was engaged in by all members of the Society present. Plans for special programs to be given during 1925 are being made under the direction of Dr. W. I. King and Dr. H. D. Burns, both of Albert Lea, who were appointed as the committee in charge of arrangements.

OF GENERAL INTEREST

Dr. G. H. Wahle, of the Mayo Clinic, Rochester, has moved to Boise, Idaho.

Dr. John H. Stokes, of the Mayo Clinic, Rochester, is now located in Philadelphia.

Dr. F. P. Frisch, of Richmond, is engaged in post-graduate work in New York City.

Dr. E. L. Bradley, formerly of Duluth, is now practicing his profession in Superior, Wisconsin.

Dr. Bernt O. Odegaard has moved his practice from Emmons, Minnesota, to Northwood, N. D.

Dr. D. R. Campbell, formerly of Bagley, is now located at 630 Langdon Street, Madison, Wisconsin.

Dr. G. A. Eisengraeber, of Granite Falls, is now in Los Angeles, where he will spend several months.

Dr. Henry Odland, formerly located in Minneapolis, is now practicing medicine in Seattle, Washington.

Dr. Laura A. Lane, formerly of Minneapolis, is now associated with the Philadelphia General Hospital, Philadelphia, Pa.

Dr. Albert S. Crawford, formerly of the Mayo Clinic, Rochester, has located for the practice of his profession in Madison, Wisconsin.

The fourteen year old son of Dr. J. T. Holcomb, St. Paul, was killed accidentally Saturday, January 17, 1925, when he was run over by a truck.

Dr. and Mrs. C. Eugene Riggs, of St. Paul, left January 15 for Orlando, Florida, where they will spend the winter months. They expect to return to St. Paul some time in April.

Dr. and Mrs. F. R. Woodard, Minneapolis, left the latter part of January for California, where they plan to spend eight weeks. They will be in Long Beach and Pasadena the greater part of the time.

Dr. and Mrs. Arthur Sweeney, of St. Paul, and their daughter, Miss Josephine Sweeney, left for Miami, Florida, in January. Dr. Sweeney will return to his practice after a short visit. Mrs. Sweeney and Miss Sweeney will remain in Florida for the winter.

Dr. and Mrs. Thomas A. Peppard, Minneapolis, who have been traveling abroad for several months, returned in January. They had planned to spend several months in Europe but were called home suddenly on account of the serious illness of Mrs. Peppard's mother.

Notice has been received of the death on December 10, 1924, of Dr. John Hunter, of Sydney, Australia. In company with Dr. N. D. Royle, he came to America at the invitation of Dr. William J. Mayo and Dr. Franklin H. Martin to deliver the John B. Murphy oration in surgery at the meeting of the clinical Congress of the American College of Surgeons, held in New York in October, 1924. The work of Dr. Hunter and Dr. Royle in connection with spastic paralysis has created unusual interest in the medical world. After leaving New York Dr. Hunter went to London, where he was very active demonstrating some of his work. Early in December he was taken ill with typhoid fever while in Cambridge and returning to London became very ill and died December 10th.

The Health Committee of the League of Nations is planning a method of international standardization of antitoxins and serums. In the past the hospital statistics of London, Berlin and Paris have been of little use to the American practitioners as every country has a different standardization.

At the meeting of the Minnesota Pathological Society held at the Institute of Anatomy, University of Minnesota, January 20, Dr. A. T. Henrici presented a paper on "Morphologic Changes and Rate of Growth of Bacteria." Dr. A. A. Zierold presented the subject of "Bursitis" and Dr. William A. O'Brien gave a case report.

The commission for the distribution of the prize for cancer study founded by Dr. Sofie A. Nordoff-Jung, in agreement with the foundress, has resolved to distribute the prize from now on only every two years to the double amount of the sum allotted heretofore, that is one thousand dollars. The next prize will reach distribution in 1926.

Dr. C. F. Ewing, of Wheaton, is recovering from an automobile accident in which he was injured about the head and body, suffering several broken ribs. The accident occurred when Dr. Ewing was returning from a call in the country. His automobile sideswiped a freight locomotive at a grade crossing and was dragged for some distance before the locomotive could be stopped.

The Medical School of the University of Minnesota announces a short course in Physiotherapy to be conducted at the University by Dr. F. B. Granger, of the Harvard Medical School, during the week of February 9, 1925. Special attention will be given to Electrotherapy, with the theory and practical application of such modalities as the Galvanic Sinusoidal, Faradic, and Static currents and also the Ultraviolet rays.

Furnishing of nine of the nineteen rooms in the new addition to the Red Wing Hospital, Red Wing, Minnesota, has been arranged for by organizations and individuals. Among those who will furnish rooms are the United Commercial Travelers, Kiwanis Club, Modern Woodmen of America, Mrs. Herbert Simmons Brown, of Portland, Me., Mrs. C. E. Friedrich and Miss Helen Friedrich, Mr. and Mrs. C. J. Sargent, the Junior Guild of Christ Church of Red Wing, American Legion and the Ladies' Aid of the First M. E. Church.

The following items regarding the smallpox situation in the Twin Cities will be of interest to our readers:

From January 1, 1924, until January 16, 1925, there occurred 268 deaths from smallpox in Minneapolis, thirty-nine of these deaths having occurred since January 1, 1925. During the same period a total of twenty deaths have occurred in St. Paul, three of which have occurred since the first of this year. Although there has not been a great difference in the actual number of cases of smallpox which have occurred since January 1, 1924, the difference in virulence of the epidemic is shown by the above figures.

NEW AND NON-OFFICIAL REMEDIES

The following articles have been accepted by the Council on Pharmacy and Chemistry:

ABBOTT LABORATORIES:

Tablets Benzyl Fumarate-Abbott, 5 grains.

GILLILAND LABORATORIES:

Diphtheria Toxin Antitoxin Mixture, 0.1 L+.

HYNSON, WESTCOTT AND DUNNING:

Sealed Tubes Mercurochrome-220 Soluble, 0.5 gm.

LEDERLE ANTITOXIN LABORATORIES:

Intracutaneous Tuberculin for the Mantoux Test.

LEHN AND FINK:

Corpus Luteum-L. and F. Desiccated:

Capsules Corpus Luteum-L. and F. Desiccated, 2 grains.

Capsules Corpus Luteum-L. and F. Desiccated, 5 grains.

Tablets Corpus Luteum-L. and F. Desiccated, 2 grains.

Tablets Corpus Luteum-L. and F. Desiccated, 3 grains.

Ovarian Residue-L. and F. Desiccated:

Capsules Ovarian Residue-L. and F. Desiccated, 5 grains.

Tablets Ovarian Residue-L. and F. Desiccated, 2 grains.

Tablets Ovarian Residue-L. and F. Desiccated, 5 grains.

Ovarian Substance-L. and F. Desiccated:

Capsules Ovarian Substance-L. and F. Desiccated, 2 grains.

Capsules Ovarian Substance-L. and F. Desiccated, 5 grains.

Tablets Ovarian Substance-L. and F. Desiccated, 2 grains.

Tablets Ovarian Substance-L. and F. Desiccated, 5 grains.

MALLINCKRODT CHEMICAL WORKS:

Mallinckrodt Tetrabromphenolphthalein Sodium Salt.

Mallinckrodt Tetrabromphenolphthalein Sodium Salt, 5 gm. ampules.

H. K. MULFORD CO.:

Neorobin.

Vacuum Sealed Tubes Neorobin, 1 grain.

Vacuum Sealed Tubes Neorobin, 5 grains.

NEW YORK QUININE AND CHEMICAL WORKS:

Euquinine-N. Y. Q.

E. R. SQUIBB AND SONS:

Bacillus Bulgaricus-Squibb.

NON-PROPRIETARY ARTICLE:

Tetrabromphenolphthalein Sodium.

Iletin (Insulin-Lilly) U-80.—Five c.c. ampules containing 80 units of iletin (insulin-Lilly) (New and Non-official Remedies, 1924, p. 152) in each c.c. Eli Lilly and Co., Indianapolis.

Ampules Adrenalin Chloride Solution Rx 1, 1:1000, 1 c.c.—A solution of adrenalin chloride (New and Non-official Remedies, 1924, p. 117), one part in physiological solution of sodium chloride, 10,000 parts without preservative. Parke, Davis and Co., Detroit.

Ampules Adrenalin Chloride Solution Rx, 1:2600, 1 c.c.—A solution of adrenalin chloride (New and Non-official Remedies, 1924, p. 117), one part in physiological solution of sodium chloride, 2,600 parts without preservative. Parke, Davis and Co., Detroit.

Ampules Adrenalin Chloride Solution, 1:1000, 1 c.c.—A solution of adrenalin chloride (New and Non-official Remedies, 1924, p. 117), one part in physiological solution of sodium chloride, 1,000 parts without preservative. Parke, Davis and Co., Detroit.

Benzyl Succinate-Merck.—A brand of benzyl succinate N.N.R. For a discussion of the actions and uses of benzyl compounds, see Journal A. M. A., Dec. 6, 1924, p. 1864. Merck and Co., New York.

Thigenol.—Solution Sodium Sulpho-Oleate-Roche.—A solution of the sodium salts of synthetic sulpho-oleic acid containing 2.85 per cent of sulphur. Thigenol has the actions and uses of sulphoichthyolate preparations (New and Non-official Remedies, 1924, p. 350). The Hoffmann-La Roche Chemical Works, New York.

Sterile Ampules Mercuric Potassium Iodide, 0.017 gm. (¼ grain).—A solution of potassium mercuric iodide obtained by dissolving red mercuric iodide 0.01 gm., and potassium iodide, 0.01 gm. in water, 1 c.c. Swan-Myers Co., Indianapolis. (Journal A. M. A., Dec. 6, 1924, p. 1847.)

Ergotole.—Extractum Ergotæ Liquidum.—A liquid extract of ergot containing 19 per cent of alcohol. It is standardized on the uterus of the virgin guinea-pig so that a 1:2,500 dilution of ergotole has the same activity as a 1:20,000,000 solution of beta-iminazolylethylamine hydrochloride. The actions and uses of ergotole are the same as those of ergot. Ergotole is also marketed in ampules containing 1 c.c. Sharp and Dohme, Baltimore.

Hypodermic Tablets Strophanthin 1/100 grain-Lilly.—Each tablet contains strophanthin U.S.P. 1/100 grain. Eli Lilly and Co., Indianapolis.

Hypodermic Tablets Strophanthin 1/120 grain-Lilly.—Each tablet contains strophanthin U.S.P. 1/120 grain. Eli Lilly and Co., Indianapolis.

Hypodermic Tablets Strophanthin 1/200 grain-S. and D.—Each tablet contains strophanthin U.S.P. 1/200 grain (0.325). Sharp and Dohme, Baltimore.

Ampules Ouabain 0.0003 gm. (1/128 grain)-Lilly.—Each ampule contains ouabain crystallized-N.N.R., 0.0005 gm. in 2 c.c. of a buffered, sterile normal salt solution. Eli Lilly and Co., Indianapolis.

Compressible Capsules Mercury Salicylate "Synthetic." 1 grain for Intramuscular Injection.—Mercuric salicylate 0.065 gm. (1 grain) suspended in 1 c.c. of a mixture of benzoinated lard, 67 per cent; peach kernel oil, 31 per cent; camphor, 1 per cent; phenol, 1 per cent. Synthetic Drug Co., Toronto, Canada.

Compressible Capsules Mercury Salicylate "Synthetic." 1 1/2 grain for Intramuscular Injection.—Mercuric salicy-

late 0.1 gm. (1½ grain) suspended in 1 c.c. of a mixture of benzoinated lard, 67 per cent; peach kernel oil, 31 per cent; camphor, 1 per cent; phenol, 1 per cent. Synthetic Drug Co., Toronto, Canada.

Compressible Capsules Mercury Salicylate "Synthetic," 2 grains for Intramuscular Injection.—Mercuric salicylate 0.13 gm. (2 grains) suspended in a mixture composed of benzoinated lard, 67 per cent; peach kernel oil, 31 per cent; camphor, 1 per cent; phenol, 1 per cent. Synthetic Drug Co., Toronto, Canada. (Journal A. M. A., Dec. 13, 1924, p. 1923.)

Novasurol.—The double salt of sodium mercurichlorphenyloxyacetate with barbital. Novasurol contains 33.9 per cent of mercury. Novasurol is used chiefly as a diuretic. It has the advantage over mild mercurous chloride and other insoluble mercury compounds in that it is soluble and may be administered by intramuscular and intravenous injection. The best results have been obtained in dropsies due to cardiac disease. Some authors hold that soluble mercury compounds should be used for their diuretic action, only as a last resort when other drugs have failed. As an antisyphilitic, novasurol has generally been injected intravenously mixed with one of the arsphenamines. Novasurol is supplied in ampules containing 1.2 c.c. of a 10 per cent solution. Winthrop Chemical Co., New York.

Euquinine-N.Y.Q.—A brand of quinine ethylcarbonate. (For a discussion of the actions, uses and dosage of quinine ethylcarbonate, see New and Non-official Remedies, 1924, p. 267.) New York Quinine and Chemical Works, New York. (Journal A. M. A., Dec. 20, 1924, p. 2019.)

Tetrabromphenolphthalein Sodium.—The sodium salt of a dibasic dye, tetrabromphenolphthalein. Tetrabromphenolphthalein sodium is used for the roentgenologic examination of the gall bladder. Following intravenous injection the substance appears in the gall bladder in sufficient concentration to cast a shadow to the roentgen ray. After injection, some of the patients may have unpleasant symptoms such as dizziness, nausea, various body pains, and fall in blood pressure. The use of tetrabromphenolphthalein sodium is still in the experimental stage and workers are cautioned as to the selection of types of cases in which it is indicated and its possible toxicity in large doses. To visualize the gall bladder, 4.5 to 5 gm. is sufficient for a patient weighing 125 pounds or more, and should be reduced for patients weighing less. (Journal A. M. A., Dec. 27, 1924, p. 2095.)

BLACK HAIR DYE

No black hair dye can be considered safe and not injurious. Every chemical used for dyeing the hair black is a potential trouble-maker. Some individuals who are not sensitized, may even use paraphenylendiamin for long periods without causing any disturbance, whereas others cannot use silver nitrate or pyrogallic acid. These facts should be given to the public and the user should assume the responsibility for the dermatitis which may follow. A person's sensitiveness to a given dye may be determined by its application to a covered portion of the body. *(Journal A. M. A., Dec. 13, 1924, p. 1943.)*

PROCEEDINGS OF THE MINNESOTA ACADEMY OF MEDICINE

MEETING OF DEC. 10, 1924

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club on Wednesday evening, December 10, 1924, at 8 o'clock. The meeting was called to order by the Vice President, Dr. Ulrich. There were 36 members and 2 visitors present.

The minutes of the November meeting were read and approved.

Dr. Gustav Schwyzer presented a specimen of goiter.

DR. CARL B. DRAKE (St. Paul) then read his thesis, entitled "The Clinical Significance of Glycosuria." (Publication will follow later.)

DR. E. J. SIMONS read a paper entitled "Observations on Blood Pressure During Pregnancy, Labor, and the Puerperium," by Drs. F. L. Adair and E. J. Simons. (This paper together with the discussion will be published in a later issue of MINNESOTA MEDICINE.)

The meeting adjourned.

JOHN E. HYNES, M.D.,
Secretary.

TRANSACTIONS OF THE MINNEAPOLIS SURGICAL SOCIETY

The regular meeting of the Minneapolis Surgical Society was held at the Y. M. C. A., November 6, 1924. Following the dinner at 6:30, the meeting was opened by the new president, Dr. A. E. Wilcox, who presented his presidential address.

ADDRESS TO THE MINNEAPOLIS SURGICAL SOCIETY

BY THE PRESIDENT, DR. ARCHA E. WILCOX

The Minneapolis Surgical Society has paid me a high compliment by electing me its president. The two successful years of the Society's existence, the character of its programs, and the interesting discussions held at its regular meetings are sufficient evidence upon which to base a most favorable prophecy as to its future growth and expansion.

At this time permit me to express my appreciation of the compliment you have paid me, and, in addition, to inform you that I am conscious of the great responsibility which goes hand in hand with the honor which you have so generously bestowed upon me.

It is not my intention in making this address, much as I would like, to attempt to leave in the archives of the

Society a gem of literary construction, nor shall I endeavor to flavor my message with rhetorical passages or submerge its real meaning by outbursts of oratorical high lights, for, in the first place, it would be a waste of the Society's time, and obviously no other reason under the present circumstances should be given any consideration.

The originators of this Society are still among the younger members of the profession and they are to be heartily congratulated upon the success with which they have met and overcome the difficulties of organization. They and the present members of this Society, have, by a genial and co-operative spirit, not only brought into existence a new and useful organization, but by continued united effort and careful thought are destined to develop a force in our profession which will reflect credit to its members and ultimate good throughout the community.

Nearly twenty years ago an attempt was made by a few of the younger members of the profession to organize a surgical society in this locality, but the seeds planted by these young pioneer horticulturists did not seem indigenous to the soil. Either the weather was too severe for successful propagation of the germinal ideas, or uncontrollable storms uprooted the unprotected sprouts, or careless heels crushed out the life of the unfolding buds, and the land lay waste; but now, through your efforts, the soil is broken, the ground fertilized, the crop in sight and it is up to all of us what the harvest will be.

For the coming year I have the three following suggestions to make, which I trust you will give some consideration and discussion:

1. In addition to our regular programs, which have usually consisted of the reading of one or more scientific papers, or presentation of cases, that part of the time or an additional twenty minutes or half hour at each meeting be devoted to listening to various members—previously appointed by the program committee—reading short reviews, epitomized reports or comments on current medical literature which would likely be of interest and value to the Society.

In doing this, many articles which might otherwise easily escape notice will be brought to the attention of the entire Society and much time saved in individual reading.

I would suggest, therefore, that a certain period be given over to the review of current surgical literature, the member preparing a concise short talk of five minutes—presenting only the best in the journals selected.

2. A most important responsibility of every member of this Society is the proper recording of his cases. The American College of Surgeons has emphasized this and in the standardization of hospitals you are all familiar with the requirements set forth by that organization.

Equally important, and yet much neglected by the majority of surgeons, is a proper follow-up system of cases, for only by the end results can any method of procedure be carefully weighed and facts separated from fads.

I would suggest that after careful discussion a standardized method for the following up of cases be adopted by members of this Society and put into effect as soon as possible, and that at the termination of a certain period the members report jointly on the end results of certain procedures.

A committee could be appointed to formulate some simple yet efficient method and present same to the Society for adoption.

3. It seems that daily the cancer problem becomes of more importance. Dr. John Clark says in his review, "Although no startling facts have been determined relative to the etiology of cancer, research workers are not discouraged; in fact, there is probably more scientific investigation into the mysteries of cancer being carried on at present than at any time in the past."

You are all familiar with the interesting and untiring efforts of Bloodgood, and while he is being supported by a host of friends, contributors, and former patients, it is due largely to his individual efforts that much valuable information regarding cancer is being collected.

Our own University in Minnesota is building, through the beneficent gift of the Christian family, another research unit, and we especially, as a surgical society, should give it every support possible,—reporting cases in detail, furnishing specimens and information in every way possible as well as placing our shoulders to the wheel of public education whenever the request is made. The value of education of the public regarding cancer, without any question, is beginning to be shown in recent statistics, particularly as regards early consultation, and cannot but help improve figures of ultimate results.

I would suggest that the new journal called "Cancer" be regularly reviewed in the current literature, and that the concentrated effort of this Society in every possible way manifest itself in co-operating with all research work, local and national, in an attempt to encourage these workers if not adding an atom of new knowledge toward helping in the control and cure of this dread disease.

Minneapolis, Oct. 9, 1924.

Dr. Martin Nordland read a paper on "Some Practical Points in Surgery of the Thyroid." (See page 104.)

DISCUSSION

Dr. R. E. Farr opened the discussion. He stated that he wished to congratulate Dr. Nordland on the paper. The classification as given by Dr. Nordland was a little different than ordinary classifications, but it is one recently used by surgeons. Dr. Farr spoke of the advisability of ligating the inferior as well as the superior thyroid in preparing exophthalmic patients for their thyroidectomy. He called attention to the danger of giving iodine in certain cases, as it may activate a toxic goiter. As interesting points in the technique, Dr. Farr spoke of his effort in trying to meet psychic factors which might present. He disagreed somewhat with Dr. Nordland as to his method of anesthesia, stating that local anesthesia was merely one part in a scheme of handling patients with exophthalmic goiter. When a patient with a severe exophthalmic goiter comes to the hospital the effort is made to do everything possible to make the situation ideal. He keeps the patient in igno-

ance as to the details of the management, but he acquaints friends or relatives. He tells the patients that they are to be treated rather than operated upon. When the rapid pulse rate and other unfavorable signs have subsided the patient is taken to the operating room, where the room is arranged as for an operation. The neck is cleaned with alcohol and gentle manipulations about the neck are made and even sterile hypo may be given in the neck. The patient is then returned to her own room. Often such a procedure will cause a rapid pulse and a recurrence of the nervousness, etc., but as a rule she improves from this readily. She is taken to the operating room several times two or three days apart, depending on the reaction at the trips, until it is found that these trips do not cause a marked disturbance. Then upon one of these trips and before the patient realizes that she is being operated upon, the operation is nearly over and she escapes many of the untoward effects of the operation. In such a scheme it might be said that local anesthesia was perhaps 20 per cent and the general method 80 per cent. It is important to have someone at the head of the patient to help control her mental reaction and to encourage the patient. Dr. Farr refers to such an individual as a psychic anesthetist.

Another point he spoke of was when the incision is made through the skin and the platysma, if desired, the upper flap is undermined for perhaps 1.5 inches, the muscles are divided above the level of the skin incision, then the whole flap is raised upwards as far as needed to expose the gland; that is, the muscles are left in contact with the overlying tissues rather than to expose the outer surface for any length before dividing them.

In speaking of the scar, Dr. Farr mentioned the fact that after having discarded skin clips a few years ago he has begun using them again recently. One-half of the clips are removed on the day following the operation and the rest on the second day.

Dr. H. B. Sweetser spoke about the preoperative treatment of goiter patients. Simple goiter patients need no preoperative treatment. If an exophthalmic patient comes to the office during a crisis with a marked tremor, fast pulse, etc., and is operated upon, he will die. He should be sent to the hospital for preparation. Keep the patient from his friends and give him bromide, if necessary. He uses Lugol's solution, 10 mm. three times a day, and under such management it is the rule to notice a marked improvement. He has lost no goiter patients in about ten years. At the University Hospital he was shown one patient who had received 10 drops of Lugol's solution without improvement. He was transferred to another service and given 20 drops a day with a very marked improvement. The experience, Dr. Sweetser said, had stood him in good stead. He thinks that administration of Lugol's will make it unnecessary to ligate the superior thyroids in many cases.

In regard to *x*-ray and radium treatment, he has operated upon several cases where *x*-ray and radium had been used and a relapse had occurred within a few weeks. Concerning anesthesia, his method is to let the patient have a general anesthetic, nitrous oxide, if desired. He uses local whether or not gas is to be given. If after the incision is made the patient is restless, gas is given before the operation is completed. He said that he thinks it is advisable to drain the patient for twenty-four hours after the operation. Crile gave statistics of a mortality of less than 1 per cent. Men who are careful do not operate on a patient with exophthalmic goiter the day after they see them.

He spoke of the importance of removing a portion of both lobes and stitching over the capsule afterwards. He seldom sees the recurrent laryngeal nerve. For many years he had a tracheotomy tube ready in case it should be needed, but he has not used one for so long that he is not sure it is always put in readiness.

Dr. Angus Cameron spoke about the administration of iodine. He stated that at the present time he has a girl seventeen years old in the University Hospital with exophthalmos. She was given Lugol's solution and was distinctly worse. She was ligated and was very much better. He does not doubt that this was a true exophthalmic goiter. He stated that the medical service was disappointed with the results obtained in exophthalmic goiters. He spoke of the difficulty of determining whether or not certain goiters are malignant. He told of a patient who had a discharging sinus who had been operated upon by a member of the surgical staff at the University Hospital. A section of the thyroid was removed and the pathologist made a diagnosis of malignancy. *X*-ray treatment was given. The patient returned in three years with symptoms of exophthalmos and was operated upon again, when it was found that the isthmus was the part most involved. This was removed and the section sent to the same pathologist, when a diagnosis of non-malignant goiter was made.

Dr. E. K. Green asked a question about the treatment of toxic adenomas. He said that while it was easy to know what to do with exophthalmic goiter the toxic adenomas offered the greatest problems in treatment.

Dr. J. M. Hayes discussed the paper in general.

Dr. Nordland closed the discussion and emphasized the importance of making a correct preoperative diagnosis. Many men who enjoyed good reputations merely told a patient that they had a goiter without, apparently, trying to distinguish the different types.

The meeting was adjourned.

WILLARD D. WHITE,
Secretary.

More Misbranded Nostrums. — The following products have been the subject of prosecution by the federal authorities charged with the enforcement of the Food and Drugs Act: Doane's Kidney Pills (Foster-Milburn Co.), consisting essentially of potassium nitrate, ground leaves of uva ursi, a trace of volatile oil such as turpentine or juniper oil, a resin, starch, sugar and talc. (For years the advertising of "Doane's Kidney Pills" has long been an offense against the public health. Its advertising methods have been such as to frighten the public into the belief that pain or soreness in the lumbar region is indicative of kidney disease.) Lafayette Headache Powders (Lafayette Co.), consisting essentially of acetanilid, daffein, sodium bicarbonate and aromatics, including cinnamon and ginger. Grogan Mineral Water (Grogan Wells and Boone Institute of Massage), containing large numbers of bacteria and gas-forming organisms, indicating that the water was polluted. (Jour. A. M. A., Aug. 23, 1924, p. 631.)

PROGRESS

Abstracts to be submitted to Section Supervisors.

Members are urged to abstract valuable articles which they run across in their reading and send the abstracts to the physicians in charge of the respective sections. In order to avoid duplication it would be well to communicate with one of the section supervisors before the article is abstracted.

MEDICINE

SUPERVISORS:
F. J. HIRSCHBOECK,
FIDELITY BLDG., DULUTH
THOMAS A. PEPPARD,
LA SALLE BLDG., MINNEAPOLIS

PNEUMONIA—DIAGNOSIS AND TREATMENT: David Riesman (Medical Clinics of North America, November, 1924). The article is the basis of a lecture on pneumonia at the University of Pennsylvania, and is abstracted chiefly because the data concerning pneumonia are concisely and systematically summarized.

During the past two years it has been determined that there is an atypical type of pneumococcus elaborating somewhat on the original classification of the four groups, which according to 454 cases from the Rockefeller Institute are of the following percentages in their incidence:

Type I. 33 per cent.
Type II. 29.3 per cent.
Type II (atypical). 4.3 per cent.
Type III. 13 per cent.
Type IV. 20.3 per cent.

It was also noted that of 160 contacts with pneumonia patients, who themselves had not contracted the disease, 13 per cent showed either Type I or Type II pneumococcus, and of 297 non-contact controls only .3 of 1 per cent showed the pneumococcus.

Although pneumonia is frequently preceded by a slight cold, it is undoubted that in view of the pneumococcus' absence in the mouth in normal individuals it is transmitted by contact more frequently than is generally supposed, and the recent inauguration of compulsory quarantine in Pittsburgh is being watched with interest.

Considerable space is given to the differential diagnosis of pneumonia, and to the distinguishing features of pneumonia in children. He believes that the latter is a more common occurrence in children than the text-books ordinarily claim, and that the physical signs are frequently late in appearing. The high fever, leukocytosis and expiratory grunt are suggestive symptoms.

The various curative measures employed in pneumonia may be divided into:

(a) Specific treatment
(b) General treatment
(c) The treatment of complications

Under the specific treatment we have:

(1) The use of serum from immunized animals
(2) Serum from convalescent pneumonia patients
(3) Serum or blood from birds, chiefly chickens
(4) The use of extracts of anti-bodies made from pneumococci themselves
(5) Chemo-therapy

Of the sera from immunized animals the only one which has proved of value is the Type I serum, and even in this instance the mortality has not been reduced sufficiently to give such serum the rank of an ideal specific. In its use it must be given as early as possible, in large amounts, intravenously, with due caution relative to anaphylaxis and serum sickness.

The statistics based upon the treatment of pneumonia with the serum or blood from birds and the extracts of anti-bodies from pneumococci themselves are insufficient in number to warrant any definite conclusions.

Chemo-therapy with quinine and mercurochrome is not of certain value.

Stewart's report on the treatment of 12 cases of pneumonia with diathermy, with a mortality of 20 per cent, is too meagre to warrant any analysis. The general treatment is based on the copious administration of water, absolute rest, no sponging except in unusual cases, alkalinization of the patient, a restricted diet, careful observation for beginning myocardial failure, and the treatment of definite distressing symptoms such as cyanosis, tympany, insomnia, and cough.

The writer believes that delayed resolution is due to a failure of proper liquefaction of the exudates through a lack of ferment or to an excess of anti-ferment; to empyema; abscess of the lungs; tuberculosis; pericarditis; syphilis; residual edema; and other complications of lesser moment, such as arthritis, middle ear disease and hepatitis.

DR. F. J. HIRSCHBOECK.

TOTAL PARALYSIS OF THE HEMIDIAPHRAGM FOR EARLY PULMONARY TUBERCULOSIS: John Alexander (American Review of Tuberculosis, 1924, x, 27).

This contribution from the Department of Surgery of the University of Michigan Medical School has reference to the removal of the upper portion of the phrenic nerve in order to paralyze one-half of the diaphragm. It has, according to the author, been found useful in the treatment of:

A. Acute, highly febrile, progressive caseous type of pulmonary tuberculosis in which pneumothorax and extrapleural thoracoplasty are contraindicated.

B. For the less acute types in which pneumothorax cannot be induced because of adhesions or in which thoracoplasty is feared because the patient's general condition is poor.

C. For those cases in which no contraindications to pneumothorax or thoracoplasty exist but in which phrenicotomy might be expected to effect as good results or to supplement a pneumothorax or thoracoplasty.

The radical phrenicotomy proposed, the technique of which has been described by the author in previous articles, is considered preferable to simple section of the nerve in the neck, as the diaphragm sometimes fails to remain paralyzed after the latter procedure. The effect of the more radical procedure is a marked diminution of the capacity of the side of the chest affected on account of the rise of the

diaphragm, which sometimes amounts to 11 cm. distance above its level on the other side.

Felix, Sultan and Zadik are quoted as having secured satisfactory clinical results but no details are given.

A. T. LAIRD.

SURGERY

SUPERVISORS:
DONALD K. BACON,
LOWRY BLDG., ST. PAUL
VERNE C. HUNT,
MAYO CLINIC, ROCHESTER

INFLAMMATORY CARCINOMA OF THE BREAST: Lee and Tannenbaum (Surgery, Gynecology and Obstetrics, Nov., 1924). The authors present a study and analysis of twenty-eight cases of inflammatory carcinoma of the female breast.

The condition is rare, representing but 1.3% of all cases of mammary cancer, and presents such unusual clinical manifestations that they are often misinterpreted by the physician first consulted. Examples of this unusual type of mammary cancer have been described by numerous observers but with variations in terminology, suggesting the uncertainty which exists regarding its true nature.

The disease is often fulminating and may result fatally in a short time without subjective symptoms, other than heaviness and slight burning sensation. The breast on the affected side usually increases in size, the enlargement being more often diffuse, but in some instances a rather ill-defined tumor may be mapped out which is often soft in consistency and never of stony hardness. Almost always the lesion has occurred in patients with pendulous breasts, and in 50% of these cases lactation had never occurred.

The rate of growth is very rapid and often the tumor fills the entire breast in a few weeks. Shortly after the onset of symptoms a careful physical examination will reveal certain inflammatory manifestations in and about the involved breast. The overlying skin is reddened and brawny and this blush may extend far beyond the normal limits of the mammary gland. Upon palpation the skin is hot and often slightly tender. Both breasts may be involved almost simultaneously or in rapid succession. When seen early nipple retraction may be absent, but later there is definite retraction and sometimes edema. The axillary nodes of the same side become involved early, increase rapidly in size, and are unusually bulky. The supraclavicular nodes of the same side are palpable early. Later nodes in the opposite axilla become involved and the opposite breast may be invaded by the disease.

As the disease progresses the skin becomes deep red or reddish purple and to touch is brawny and infiltrated. The inflamed area presents a distinct raised periphery and is easily recognized. The redness may extend far beyond the normal confines of the breast. As a rule there is no well marked elevation in temperature and there are no constant blood findings. The patients remain well nourished until late in the course, cachexia appearing only in the terminal stages. They die from systemic metastasis with certain evidence of toxemia. The inflammatory symptoms of the disease persist until the end.

The whole picture is one of an acute fulminating process and appears to be a distinct clinical phase of carcinoma of the breast. Many of the patients in this series were young women, the average age for the entire group being 44.6 years. The most striking pathological change is a wide invasion of the dermal lymphatics by carcinoma. Bacteriological and biochemical studies have failed to explain the inflammatory manifestations.

Surgery is contraindicated in this disease, probably because of the diffuse invasion of the dermal lymphatics. At present radiation offers the only hope of palliation, diminishing the patient's suffering and giving a definite prolongation of life.

J. W. STINSON, M.D.

ENTEROSTOMY AS A THERAPEUTIC AND DIAGNOSTIC MEASURE: Miles D. Porter, M.D. (Annals of Surgery, vol. lxxx, Oct., 1924, page 501). The author states that enterostomy might be resorted to more often than it is and with advantage. Enterostomy is used to signify opening of any part of the intestinal tract regardless of whether or when closure is to follow.

Many patients with acute bowel obstruction complicating abdominal infection die from obstruction which is not relieved. The author reports one case in which a patient with puerperal infection and extreme abdominal distention recovered rapidly and satisfactorily following an enterostomy done in bed.

"Enterostomy in an obstructed loop of intestine prior to removal of the cause of obstruction will frequently aid in determining whether or not excision is necessary, will lessen the danger of fatal toxemia following the relief of the obstruction, and make the relief of the obstruction much easier.

"Given a volvulus or strangulated hernia wherein the viability of the involved bowel is questionable, opening and draining the gut helps one to determine more quickly and certainly for or against excision and removes the danger of toxemia from the passage of the stagnant content through the remaining part of the gut."

Many deaths following operation for bowel obstruction might be prevented by opening and draining the obstructed bowel of its contents *before the obstruction is removed.*

Several cases of supposedly malignant conditions of the colon are cited which were relieved and cured by colostomy, and a case of supposedly malignant obstruction of the pylorus was reported relieved and cured by gastrojejunostomy.

Colostomy relieves some cases of diverticulitis of the sigmoid and rectum.

Horsley advises enterostomy after resection of the colon. Enterostomy is also advised by others, particularly when the resection is on the right half of the colon in which a preliminary colostomy has not been done.

WM. P. HERBST, M.D.

EXTRAPLEURAL THORACOPLASTY IN THE TREATMENT OF PULMONARY TUBERCULOSIS: Wm. H. Thearle (American Review of Tuberculosis, 1924, x, 1). The use of the Brauer-Friedrich operation in which the major portions of all ribs on one side of the chest were resected has practically been abandoned for collapse therapy. The operation at present understood under the term "extra-pleural thoracoplasty" is the surgical collapse developed and standardized by Sauerbruch. It consists briefly in the subperiosteal resection of various lengths of the first or second to the tenth or eleventh ribs posteriorly. The operation is begun over the lower lobe and is performed in one or two stages.

The author's rule for thoracoplasty indication is as follows: "Thoracoplasty is indicated for those patients who should have an artificial pneumothorax but in whom a pneumothorax is impossible on account of pleural adhesions." This means essentially unilateral pulmonary involvement, or if a lesion is present in the other lung, as is usually the case in chronic phthisis, that this lesion be slight or arrested and that artificial pneumothorax has been tried and found impracticable.

The report presented is based on the experience of the author in 13 patients treated during the past year. The patients were mostly adult males at the Fitzsimon's General Hospital of the U. S. Army at Denver. Two patients died from the operation, two are unimproved on account amyloid visceral changes and intestinal tuberculosis which appeared soon after the operation, six are markedly improved, one case is slightly improved and two cases are practical cures, according to Sauerbruch's definition. The time the cases have been under observation is hardly long enough to warrant conclusions as to permanent cure.

The author believes that thoracoplasty should be performed in indicated cases at an earlier period in the disease.

A. T. LAIRD.

UNRECOGNIZED HEMORRHAGE WITHIN THE UPPER LEG: Larkin (Surgery, Gynecology and Obstetrics, Nov., 1924). The author calls attention to the possibility of losing enough blood in the upper leg following injury to cause death, and he cites four cases of injury to the upper leg which ended fatally. Death may come either instantaneously from rapid extravasation of blood, or from slow oozing for hours or even days. The cases presented showed symptoms of shock and hemorrhage following the injury with no external signs of bleeding to account for it.

At autopsy the circumference of the injured legs was found to be greater, and, when opened, one and one-half to two quarts of blood were present infiltrated between the fascial planes and musculature. The condition of hemorrhage can be overlooked easily unless the injured leg is compared with the uninjured.

In cases of death following fracture of the femur an unrecognized extensive hemorrhage within the leg may actually be a factor of paramount importance in the fatal issue. In crushing injuries to the thigh with or without fracture, with progressive symptoms of shock, a progressive increase in the circumference of the thigh may direct attention to a serious hemorrhage in soft tissues of the part.

J. W. STINSON, M.D.

FRACTURES ABOUT THE UPPER END OF THE HUMERUS: Howard E. Santee (Ann. of Surg., July, 1924). This paper analyzes seventy-five consecutive cases of fractures of the upper end of the humerus, namely: head, neck and adjacent portion of shaft.

The fractures are grouped on anatomical lines as well as on the basis of pathological displacement, as follows:

(1) Anatomical neck—4 cases
  (a) Simple—3 cases
  (b) With dislocation—1 case

(2) Greater tuberosity—5 cases
  (a) Simple—4 cases
  (b) With dislocation—1 case

(3) Lesser tuberosity—2 cases
  (a) Simple—0 cases
  (b) With dislocation—posteriorly 2 cases

(4) Surgical neck—64 cases
  (a) Simple with slight or no displacement—13 cases
  (b) Simple with gross displacement—31 cases
  (c) Complicated combining gross displacement of neck with greater tuberosity displacement—17 cases
  (d) With dislocation—3 cases

Treatment and results:

Group I—Two cases were treated by excision and two by suspension, abduction and rotation. Results were all ultimately good.

Group II—Here the treatment is suspension, abduction and external rotation, with good results in from five weeks to eleven months.

Group III—The treatment of these cases will be discussed in a later paper.

Group IV—(a) Treatment. In fifty cases suspension, traction, abduction, and external rotation were used. The optimum position is wide abduction with external rotation. Angulation at site of fracture occurs in some cases when the upper end of the shaft is grossly displaced internally. Muscle spasm in the pectoralis major, latissimus and teres major probably play the major role in the angulation. In these cases it is necessary to gradually abduct the arm reaching the maximum in from seven to ten days. The fractures are suspended for four weeks, then immediate active exercise is encouraged. This treatment is thought the most logical because the disability manifests itself in three divisions; limitation in abduction and rotation, and loss of power.

(b) Results:

I—Fractures of surgical neck with little or no displacement. Six cases were followed; one treated by a Sayre dressing, good result in three months; one treated by abduction and external rotation on pillows, good result in four weeks; three cases suspended, good results in eight,

nine and twelve weeks; one fair function in one year treated by suspension.

II—Fractures of surgical neck with gross displacement. Nineteen cases followed, all treated by suspension; fifteen good functioning shoulders in from two to nine months; thirteen within five months; two fair results when last seen at two and three months, respectively; two distinct failures.

There were six cases of fractures of the surgical neck which required operations. The indications for operation were: (1) complicating dislocation not reducible; (2) gross displacements or comminution of the head where no apparent contact between fracture surfaces could be established. Of the six cases operated upon, five were complete failures and only one showed a little encouragement.

E. A. Bothe.

MALIGNANT EPITHELIAL TUMORS OF THE THYROID: Allen Graham, M.D. (Surgery, Gynecology and Obstetrics, Vol. XXXIX, December, 1924, No. 6, pp. 781-790). One hundred and thirty-four patients with thyroid disease form the material upon which this study was made, which includes all cases at the Lakeside Hospital from 1905 to 1922. One hundred and twenty-two tumors were studied pathologically, consisting of one parastruma, ten sarcomata, three sarcoma-carcinomata, and 108 epithelial tumors, malignant or suspicious. The last group only is considered at this time. The incidence of malignancy in thyroid tumors varies between one and two per cent.

"Carcinoma is intended to include all epithelial tumors that show any clinical or pathological evidence of malignancy. Malignant adenoma is applied to any tumor that is or was an adenoma and has become malignant. Malignancy is evidenced by one or more of the following: Local invasion, recurrence of the original tumor after incomplete excision, metastasis, death of the patient due to the invasion of the tumor."

The histological picture of invasion of the capsule, invasion of the blood vessels, recurrence, or metastasis is invariably evidence of malignancy. In only thirty to forty per cent of the cases reported here was such histological evidence found, leaving from sixty to seventy per cent in which malignancy was doubtful morphologically.

The malignancy of the tumor does not depend upon the morphology, differentiation, et cetera, of the individual cells or groups of cells, but upon local invasion or destruction, postoperative recurrence, distant metastasis, and the death of the patient.

"The most constant single indication of thyroid epithelial malignancy is invasion of the blood vessels. Scirrhus and papilliferous adenocarcinomata are the only two types of epithelial malignancy in which invasion of the blood vessels has not been observed. These two types constitute about fifteen per cent of the total, and are primary lymphatic invaders."

There are many photomicrographs in this article to illustrate the text.

William P. Herbst.

PEDIATRICS

SUPERVISORS:
CHESTER A. STEWART,
LA SALLE BLDG., MINNEAPOLIS
ROY N. ANDREWS,
MANKATO CLINIC, MANKATO

FOREIGN BODIES IN THE AIR AND FOOD PASSAGES OF INFANTS AND CHILDREN, WITH ESPECIAL REFERENCE TO THE CLINICAL DIAGNOSIS: Russell S. Rowland, M.D. (Am. Jour. Diseases of Children, August, 1924). The diagnosis of foreign bodies in the air and food passages rests on the history, the physical signs and symptoms, and the roentgen-ray and endoscopic examinations. The object of this paper is to stress the importance of the history, symptoms and physical signs; in other words, the clinical diagnosis as well as the study by roentgen ray and endoscopy in every suspected foreign-body case. Jackson says that the roentgen ray is the most valuable single aid in diagnosis, but that a careful physical examination should always be made first. In many instances it is only by seeking the history and studying the signs and symptoms that an early diagnosis, frequently so essential to successful surgical treatment, can be made. McCrae finds that from 10 to 15 per cent of all such foreign bodies cannot be demonstrated by roentgen ray. In such patients the physical examination is of the utmost importance, and the diagnosis should be completed by an endoscopic examination.

Foreign Bodies in the Bronchi and Lungs: McCrae, in discussing this subject, mentions three important diagnostic points: (1) decreased expansion of the affected side, (2) "tissue paper râles." These râles he described as finer and softer than the early crackling râles heard in lobar pneumonia. They occur at the end of inspiration, are more marked on deep breathing and give the impression of coming from a distance, (3) "asthmatoid wheeze." It differs from the wheezing sound heard with bronchial asthma but the difference is difficult to describe. The wheeze varies in pitch and loudness depending on the character of the foreign body causing it. It can never be heard over the chest wall.

Usually the higher the foreign body is lodged in the respiratory tract, the more pronounced the symptoms; while the lower down it is, the more marked the physical signs. With bronchial foreign bodies signs of partial or complete obstruction of a bronchus are diagnostically of the most importance. A fuller appreciation of these facts and of the importance of the history, signs and symptoms will help us to recognize more promptly some of the unusual foreign-body cases; it will assist us to differentiate the acute conditions from pneumonia, and the chronic cases from tuberculosis and empyema.

R. N. Andrews, M.D.

TREATMENT OF PROLAPSE OF RECTUM BY ALCOHOL INJECTION: Alan Brown, M.D., and T. G. H. Drake, M.D. (Archives of Pediatrics, October, 1924). Many methods have been advocated for the treatment of rectal prolapse, most of which are not very satisfactory.

The authors wish to report three cases, one with autopsy findings, in which cures were obtained by the simple method of alcohol injection. In a paper by Findlay, records of 23 cases cured by this method are reported.

The procedure is as follows: The skin about the anus is cleansed by alcohol. The patient is then given a general anesthetic. A needle 3 inches long is attached to a Luer syringe containing 1½ c.c. of absolute alcohol. This is inserted at one side of the anus, ¼ inch outside the junction of the mucous membrane and skin, and just posterior to the middle line with the child on its back. With the finger in the rectum as a guide, the point of the needle is passed up along the rectum and at a distance of 2 to 2½ inches the whole of the alcohol is injected, the needle withdrawn and the procedure repeated on the opposite side. The buttocks are then strapped together with adhesive. The most satisfactory strapping in their experience was a fairly wide single piece of adhesive, with the edges nicked to conform to the shape of the body more readily, having a small opening cut in the center through which to pass stools. A diaper with a pad is fixed firmly over this and the strapping is kept in place for from one to two weeks, after which no further treatment is necessary.

The treatment can be readily performed and there is no difficulty experienced in injecting the alcohol in the proper place. Care should be taken not to tilt the tip of needle too far forward towards the anterior abdominal wall to prevent entering the peritoneal cavity. The theory of the action of the alcohol is that it sets up adhesions between the bowel and the tissues about it, and through these adhesions, and since through the prevention of any further prolapse the tone of the sphincter is restored, a cure is obtained. In only five of Findlay's cases was more than one treatment necessary.

R. N. Andrews, M.D.

A STUDY IN PREVENTIVE AND SOCIOLOGICAL MEDICINE: Mark S. Reuben (Arch. of Ped., July, 1924). The home is the fundamental basis for consideration and improvement, if there is to be any improvement in any individual member. Economic conditions of the family must therefore receive careful attention. When there is proper adjustment of internal to external relations we have perfect health. If the income of the father is not enough to cover the necessities of life and does not permit a minimum normal standard of living, then either mother and children are driven into industry and home life is neglected or else the standard is lowered, and we have bad housing, undernourishment and all other hideous results of poverty. The home should be the foundation of social improvement. Two-thirds of the delinquent children come from homes that no city should permit to exist.

R. N. Andrews.

MORBID HABITS IN INFANCY AND CHILDHOOD: Joseph H. Marcus (Arch. of Ped., May, 1924). The child is a creature of habits, good and bad, and there is no period of life at which habits are so readily established as in infancy and childhood. Among these bad habits are mentioned the following: masturbation; sucking; pica, or preverted appetite; nail-biting; teeth-grinding; head-rolling and head-banging; habit spasm.

The vast majority of cases of masturbation in infancy and childhood occur in girls; the true masturbation of late childhood is much more common in boys. One reason which may account for its frequency in girls is the great liability to vulval irritation from lack of cleanliness or from actual vulvovaginitis. Any irritation may cause the child to rub the parts in some manner, and a pleasurable sensation being excited, this action is repeated until the habit has been established. Only in a few cases does the child use the hands to cause friction to the genitals.

One important factor in the successful treatment of this condition is its early recognition. The child should be kept in a sitting posture as much as possible, as the habit is oftentimes practiced when in the reclining posture. If there is definite evidence of inflammation or local irritation, a calamine lotion will be found useful. Belladonna combined with the bromides sometimes brings about a beneficial result; the belladonna is gradually increased and the reaction cautiously watched. Whatever form or forms of treatment are used, it must be impressed upon the parents that this habit is a decidedly pernicious one, and that it must be eliminated at all costs. The mother or father should talk to the child in a matter of fact manner, and should make every effort to gain the confidence of the child, and direct her influence towards the strengthening of the child's will and character.

Thumb-sucking and tongue-sucking: Deformities of the thumb or the finger are sometimes produced; also of the teeth and lips, and even of the jaws. Mechanical restraint in infants is the only successful cure in most cases. Splints or cuffs applied to the elbow, so as to prevent flexion, are a most useful procedure.

Pica or perverted appetite is a peculiar and very curious desire to eat queer articles of diet, such as mud, mortar, coal, cinders, gravel, plaster from walls, paper, and hair. The treatment must be of vigilance on the part of the guardian or the nurse, in the prevention of this abnormal appetite for foreign articles.

Nail-biting: This habit is best remedied by keeping the fingernails cut very short, and by the wearing of gloves or mittens.

Teeth-grinding: The habit may be caused by caries of the teeth. In most cases there is a chronic indigestion present.

Habit spasm: Children sometimes develop certain spasmodic contractions of a group of muscles that may result in a rather distressing habit. This condition of habit spasm is simply a sign of a neurotic tendency, and, generally speaking, leads to no bad results. In many cases having the child sit before the mirror while making the effort to control the spasm may prove effective.

R. N. Andrews.

CLINICAL STUDY OF LACTIC ACID MILK AS A ROUTINE FEEDING FOR SICK AND HEALTHY INFANTS: Manning C. Field (Arch. of Ped., August, 1924). Now the most important reasons why lactic acid milk is better suited to the needs of infants than is sweet milk, assuming artificial feeding to be necessary, are as follows:

1. The protein in acid milk is precipitated as a fine flocculent curd and remains so in the stomach until the process of digestion has broken it down. The boiling of raw milk partially accomplishes the same thing, but also partially destroys the vitamines.

2. An extremely important factor in selecting a food for young infants is its "buffer" or, as Marriott says, its acid-binding qualities. Lactic acid milk is similar in this respect to breast milk, the ph. of the gastric contents at the height of digestion of a group of infants fed on whole lactic acid milk having been found to be 3.71, while the average hydrogen ion concentration of the stomach contents of the same group fed on breast milk was 3.75, which is probably about the optimum concentration for gastric digestion in infants under one year.

3. A third reason why lactic acid milk is better than sweet milk for feeding infants is that it is practically sterile even under the most adverse conditions, or rather under the most favorable conditions for bacterial growth, other than the presence of lactic acid.

4. Furthermore, in lactic acid milk we have a maximum of food value with a minimum of bulk, which in many cases is of distinct advantage. In lactic acid milk we have this increased protein as well as fat approximating in percentage, and apparently in digestibility, that of breast milk.

Up to the present the author has seen no ill effects from feeding lactic acid milk routinely to sick and well babies; on the contrary, he has found it, clinically, to have definite advantages over the usual sweet milk mixture. He has modified it somewhat at times by varying the amounts of karo and by removing part or all of the cream, and in one or two instances by adding a small amount of water.

R. N. ANDREWS.

THE RELATION OF GONORRHEAL PROCTITIS IN MALE INFANTS TO HOSPITAL EPIDEMICS OF VULVOVAGINITIS: Albert H. Byfield, M.D., and Mark L. Floyd, M.D. (Archives of Pediatrics, October, 1924). Rectal gonorrhea in male infants may occur in the course of a ward epidemic and not cause sufficient signs and symptoms to arouse suspicion that this trouble is present.

Such infection may be the source of repeated late outbreaks when the epidemic is believed to have been stamped out.

The rectal thermometer is probably the carrier.

It is always well to check up in hospitals on the custom of taking temperature. Trays with individual receptacles for thermometers or individual containers for thermometers should always be used in a baby's ward.

R. N. ANDREWS, M.D.

ROENTGENOLOGY

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COOLIDGE TUBE QUANTITATIVE VARIATIONS: MacKee and Andrews (Am. Jour. Roent., June, 1924). Coolidge and Kearsley demonstrated, by means of ionto quantimeter measurements, that considerable variation occurred in the energy output of different Coolidge tubes. Apparently the difference was much less marked in filtered than in unfiltered radiation. As a result, radiotherapists are advocating the use of filtered radiation in skin therapy for purposes of greater safety.

The authors conducted a series of practical experiments using ten different Coolidge tubes, unfiltered, delivering either an erythema or an epilation dose under exactly similar conditions. They found that, in spite of marked differences in the energy output, as measured by the ionization chamber, the differences in reaction produced by the different tubes were so slight as to be negligible.

In view of these experiments and the practical experience of radiotherapists, they believe that the factor of safety is so large that unfiltered radiation, measured by indirect methods as now generally used, can continue to be used without danger of untoward results due to differences in energy output of different Coolidge tubes.

LEO G. RIGLER.

INVERSE SQUARE OF DISTANCE LAW FOR FILTERED ROENTGEN RADIATION: MacKee and Andrews (Am. Jour. Roent., July, 1924). Chiefly as a result of pastille measurements, Witherbee and Remer have attempted to prove that the intensity of radiation varies inversely as the distance in filtered radiation, in contrast to the rule in unfiltered radiation, in which it varies inversely as the square of the distance.

The authors believe pastille measurements to be entirely unreliable. They conducted two series of experiments. In one they measured energy output by the ionization chamber; in the other they determined the effects upon the skin of filtered radiation at various distances and various periods of exposure.

Their experiments indicate that the "inverse square of distance" law holds for filtered radiation as well as for unfiltered. There is such a large margin of safety in filtered radiation that it is difficult to detect differences in reaction with exposures which differ radically. Nevertheless, the ionic measurements and careful observation of the intensity and duration of the reactions indicate clearly that double the distance requires quadruple the time to obtain equal reactions.

LEO G. RIGLER.

BOOK REVIEWS

BOOKS RECEIVED FOR REVIEW

REPORT OF THE SCIENTIFIC RESEARCHES ON THE VENEREAL DISEASES. Edward L. Keyes, M.D. New York: The American Social Hygiene Association, 1924.

THE PRACTICAL MEDICINE SERIES. GENERAL SURGERY. Vol. II. Albert J. Ochsner, M.D., Editor. Chicago: The Year Book Publishers, 1924.

MEDI-CULT. THE A-B-C OF THE MEDICAL PROFESSION. B. F. Lorance, M.D. 73 pages. Boston: Richard G. Badger, The Gorham Press, 1924.

OUTLINES OF PATHOLOGY. E. T. Bell, Prof. of Pathology, University of Minnesota; William A. Riley, Prof. of Entomology and Economic Zoology; B. J. Clawson, Asst. Prof. of Pathology; J. C. McKinley, Asst. Prof. of Neuropathology; William A. O'Brien, Instructor in Pathology; John F. Noble, Instructor in Pathology. Edited by E. T. Bell. 586 pages. Minneapolis: University of Minnesota Press, 1924.

LOCAL ANESTHESIA SIMPLIFIED. John Jacob Posner, D.D.S., New York, Chief of Dental Department, Harlem Dispensary, etc. 114 pages. 55 illus. Cloth, $3.50. St. Louis: C. V. Mosby Co., 1924.

TREATMENT OF THE COMMON DISORDERS OF DIGESTION. John L. Kantor, Ph.D., M.D., New York City. 245 pages. Illus. Cloth, $4.75. St. Louis: C. V. Mosby Co., 1924.

This small volume is meant for a guide in the treatment of the more common forms of digestive disturbances. The technique of stomach lavage and the use of the duodenal tube are thoroughly discussed. One of the best things in it is the diet lists which are reprinted from the Vanderbilt Tables.

This volume would be an addition to anyone's library, from the viewpoint of the diet list alone.

W. C. CARROLL, M.D.

DIABETES: A HANDBOOK FOR PHYSICIANS AND THEIR PATIENTS. Philip Horowitz, M.D. 2nd edition. 231 pages. 34 text illus. Cloth, $2.00. New York: Paul B. Hoeber, Inc., May, 1924.

Although this book is described as a handbook it does not seem to fulfil its purpose. It is entirely too technical for the patient and does not give the detailed information that the physician desires. Too many case histories are given without enough laboratory information. The number of cases could well be reduced and a few described with more detail.

The methods of arriving at a glucose tolerance are well described. A little more discussion on the threshold of ketogenesis would be welcome. This volume could be expanded into a larger and more pretentious work. There is no question but that the author has had a great deal of experience and thoroughly understands the subject on which he writes.

MAX H. HOFFMAN, M.D.

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